



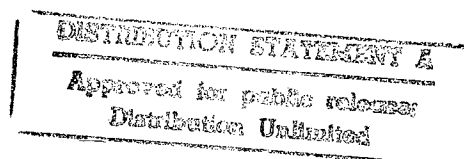
JPRS Report

Science & Technology

China

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Ease Tech Export Bans, West Urged

40100070A Beijing CHINA DAILY in English
8 Aug 91 p 2

[Article by staff reporter Zhang Yu'an]

[Text] Western countries should relax restrictions on the export of technology to China, and speed up export licence approvals, a senior foreign trade official said yesterday. This would encourage faster development of China's technology imports from the West.

The official, with the Ministry of Foreign Economic Relations and Trade (Mofert), was speaking against a background of what he called "a considerable decline" in technology imports in recent years due to administrative obstacles and restrictions imposed by the West.

"If the problem is not solved, technology trading between China and the West must be restrained, which will affect the interests of Western exporters," Liu Hu, deputy director-general of Mofert's Technology Import and Export Department, told CHINA DAILY.

For instance, he said, China decided a couple of years ago to import a big computer from a Western country for the State Meteorological Bureau to help in making medium- and long-term weather forecasts. This would benefit not only China's agricultural and industrial production, but also that of the neighbouring countries.

But the country, which he declined to specify, had not issued an export licence for the computer with an export licence even now, two years after the contract was signed.

There are many such cases, Liu said.

"It is China's long-term policy to import advanced foreign technology to renovate Chinese enterprises and promote economic development," Liu stressed, adding that technology imports from abroad in the past have played an important role in upgrading the country's agricultural and industrial production and in developing the national economy.

In the past few years, China's foreign exchange reserves have increased pretty fast and reached more than \$30 billion by the end of June this year.

In the future, Liu said, the country will spend a "considerable amount" of its surplus hard cash on importing advanced technology and equipment from foreign countries.

"China's purpose in exporting more is to import more. We hold that a trade balance should be sought on the basis of further expansion, rather than a negative 'balance-for-balance sake' attitude," he said.

Liu emphasized that China had published quite a few laws and regulations on the protection of the rights of

Western intellectual property and the interests of investors, to encourage foreign countries to transfer their technology to the country.

They included the Patent Law, the Trade-mark Law, Copyright Law, a regulation on contracts for technology imports and a regulation on protection of computer software.

Liu said China will continue as before to follow international common norms in protecting the interest of intellectual property holders.

He gave assurances that China's technology imports will increase and be all dimensional, hinting that those who are active in transferring technology to China will get more trade opportunities.

He also outlined China's key development aims for foreign co-operation in the Eighth Five-Year Plan period (1991-95).

They are the industries of energy resources, communications, post and telecommunications and electronics, he said.

Meanwhile, the country's technology export industry, though still at a primary stage, has been developing very fast and in 1990 exports reached nearly \$1 billion.

China is to hold a major technology export fair, the '91 China Technology Fair, in Shanghai, in September. The exportable technology developed by China will cover machine-building, electronics, metallurgy, textiles, chemicals, medicine, light industry, building materials, computer software, food and environmental protection, Liu said.

Science, Technology Get 6.4 Percent More Funds

40100072A Beijing CHINA DAILY in English
10 Aug 91 p 3

[Text] Science and technology projects received 13.66 billion yuan (\$2.6 billion) from the State last year, an increase of 6.4 percent on 1989.

The budget for scientific and technical research was 0.7 percent of the gross national product (GNP). This showed China's high regard for the importance of scientific and technical research and development activities, according to a statistical communique released by the State Science and Technology Commission.

Eleven State-level key experimental laboratories were built in the period and have all opened to researchers from both home and abroad.

More than 26,800 scientific and technical research projects have been completed. Last year, 4,718 research programme contracts were signed between the State and various scientific research institutes, attracting about 1.39 billion yuan of investment.

Seventy-nine of the above achievements won State prizes and 2,057 of them filled in blanks for the country in their fields. Most are focused on techniques to promote biological engineering, information, energy, space flight, lasers, automation and new materials.

The National Natural Science Foundation spent 135 million yuan last year to fund 3,531 projects, a respective increase of 8.9 and 11.4 percent on 1989.

Sixty-seven staff training centers have been set up, training 1.33 million administrative and technical personnel last year.

By the end of 1990, 37 advanced-technology research and production developing zones of and above provincial and municipal level had been established, pooling together 1,690 institutes and units and 128,000 researchers.

Statistics from 31 of the units showed a total production value of 5.94 billion yuan last year, and handed over to the State about 480 million yuan in taxation.

More than 11,180 research projects were made eligible to advance up to provincial and ministry level; 2,914 items won prizes for State-level major scientific and technical achievements; and 224 gained State invention rewards.

Some 473 patent administrative agencies handled about 41,469 cases including 4,884 foreign ones, over the past year.

More than 12,220 scientific and technical theses were absorbed into the four major international index dictionaries, 3.1 percent more than the year before.

Export of advanced technological products last year totalled \$2.69 billion, a 45.3 percent increase on 1989. Imports reached \$6.97 billion, an increase of 1.7 percent.

Statistics from across the country except for Tibet Autonomous Region and Guizhou Province indicated that 206,700 domestic technical agreements were signed, a drop of 21.14 percent.

By the end of last year, 8,565 independent scientific research and technological development institutes had been established by departments above county level. (CD News)

**Liquid-Crystal Technology R&D Center
Established**

91P60261 Beijing JINGJI RIBAO [ECONOMIC
DAILY] in Chinese 6 Jul 91 p 4

[Unattributed article: "Beijing Liquid-Crystal Technology Engineering Research Center Established"]

[Text] The Beijing Municipal S&T Commission and Qinghua University have jointly founded the Beijing

Liquid-Crystal Technology Engineering Research Center, which is the first domestic organization to conduct engineering-level research into this technology. This center will devote itself to study of technology for industrial-scale production of liquid-crystal materials and liquid-crystal displays. It is open to the public, and will become the major base for dissemination of liquid-crystal display technology to industries located around the nation, as well as a major nationwide training center in this field.

Italy, China Sign Space Collaboration Accord

91MI0430X Rome SPAZIO INFORMAZIONI
in Italian 3-10 Jul 91 pp 4-5

[Text] The Italian space delegation led by Senator Learco Saporito, under secretary for universities, with representatives from the ASI [Italian Space Agency] CIRA [Italian Aerospace Research Center], Alenia Spazio, Laben, Telespazio, Fiat Spazio, Fiar, Officine Galileo, and Ciset [Italian Technical Services Company], concluded a visit to China a few days ago. The delegation met with Chinese Minister for the Aerospace Industry Lin Zongtang in Beijing, where they signed a bilateral agreement on collaboration in space exploration and study for nonmilitary purposes. The agreement covers three areas primarily: scientific programs; microgravity tests, with the possible use of Chinese reentry capsules; and scientific and applications satellites, in particular for telecommunications and remote sensing. Furthermore, the document envisages defining other bilateral initiatives in the area of launchers and launch sites. Under secretary Saporito stated: "We consider the Chinese Long March launchers to be very interesting. Their use could strengthen Italy's position in the commercial launch services market. In view of our future independence and given the uncertainties and delays of the Italian-American San Marco Scout project, we could use Chinese launchers and launch sites." In Beijing, it was decided to establish working groups composed of scientific and industrial representatives from both countries who will identify projects of mutual interest in areas such as launchers and launch services, microgravity, remote sensing, and scientific programs. A Chinese technical delegation has been invited to come to Italy in October for a series of meetings and visits.

Two New Flight Simulators Developed by Chinese Air Force

91FE0730A Beijing GUOJI HANGKONG
[INTERNATIONAL AVIATION] in Chinese No 6,
Jun 91 pp 30-31

[Article by Xin Baoan [6717 1405 1344]]

[Text]

Abstract

The JC-2 three-dimensional CGI [computer-generated imagery] simulator is designed to provide flight training for pilots in take-off and landing under day/night and various visibility conditions; it can also provide flight training in such maneuvers as cloud penetration, hard turn, roll, zoom and dive.

The Dome Air Combat Simulator is designed to perform stall simulation and training for spin recovery, target attack, hooded cockpit, and cloud penetration. Its basic components include the cockpit, the motion system, the visual system, and the weapon system. Both simulators were developed by the Chinese Air Force.

1. The JC-2 Three-Dimensional Computerized Image Flight Simulator

The JC-2 simulator is China's first flight simulator capable of producing a wide range of environmental conditions. Specifically, it can provide flight training in visual take-off and landing under day/night and various visibility conditions, as well as realistic flight training in such maneuvers as cloud penetration, hard turn, roll, zoom and dive. The simulator is inexpensive, and has many advanced features such as image-processing capabilities, etc.; it can be used for training beginning flight students, pilots with interruptions in their flight training, and students who are ready to start a new training course.

The basic components of the simulator include the imagery computer, the imagery software, the display unit and the simulator cockpit.

Imagery Computer

The simulator uses the TMS-320 digital parallel processor for its three-dimensional imagery computer; it uses 16-bit words and has eight channels. The 16 CPU's can operate simultaneously to produce 256 different colors and 256 moving objects; the video picture is 36° x 360°, and the single-channel resolution is 512 x 512 pixels. The two-dimensional computer's CPU uses a Z-80 chip and also has eight channels; it can produce 256 different colors and is equipped with a color-toning board. Each channel has 400 x 512 pixels which can be used to simulate atmospheric effects such as cloud and fog or ground scenery covering an area of 512 km x 512 km; the field-of-view angle is 36° x 40°, and the frame frequency is 25 Hz.

The special circuit developed for this simulator can produce one pixel every 125 ns, and can pack a maximum of 256 pixels each time by using a parallel-packing technique. Also, it uses a simple fringe superposition technique to enhance the realism of three-dimensional objects on the picture.

Imagery Software

In addition to carrying out computations for ground scenery and three-dimensional objects, the imagery software also performs computer management tasks such as data transmission between the simulator and the imagery computer and the allocation of three-dimensional objects.

Imagery Displays

The imagery displays include the imagery system used by the pilot, the imagery system on the instructor's console, the two-dimensional and three-dimensional image processing system, and the camera monitoring and control system.

The imagery system used by the pilot consists of eight color projectors located on the upper part of the cockpit and the fiberglass screen which surrounds the cockpit. It

provides visual scenery which extends 360° horizontally and 36° vertically; this scenery is shown in realistic color during flight. The projector design is based on the original Sanyo 183-cm television projector; its performance has been improved in terms of frequency band, brightness, contrast ratio and projection angle.

The console imagery system allows the instructor to monitor the operation of the imagery system of the flight simulator and the flight performance of the student pilot; in addition, it can be used by maintenance and repair personnel to test the imagery system and to implement new ground sceneries.

Simulator Cockpit

The simulator cockpit is a modified cockpit of a fighter aircraft; it consists of three sections: the analysis and computation section, the control section and the instructor's console. The analysis and computation section contains a TMS-320 computer, which receives various data from the control section such as lever setting, rudder setting, throttle setting, stop-engine handle setting, aileron setting and landing-gear setting, and solves a set of simultaneous differential equations to calculate various flight data such as air speed, altitude, pitch angle, bank angle, magnetic bearing, vertical velocity and turning speed, and sends the data to the control section. The instructor's console is equipped with an IBM computer, which is used by the instructor to simulate equipment failure and interrupt-recovery conditions, display flight trajectories, print data and generate files, and evaluate flight performance.

2. Dome Air Combat Simulator for Fighter Aircraft

This simulator is the first multi-function integrated simulator developed by the Chinese Air Force. It is used to teach spin flight maneuvers, simple and complex acrobatic maneuvers, aircraft control under stall conditions, formation flight with a companion aircraft, horizontal attack against a target flying along a straight line, flight under hooded cockpit conditions, and cloud penetration.

The Cockpit

The cockpit has three sections: the cockpit instrument section, the control mechanisms and the engine sound system. The appearance and position of the instruments are identical to the real instruments; their internal designs can be divided into four different types: the synchronous-drive instrument, the d.c. servo-motor drive instrument, the magneto-electric drive instrument and the simulated instrument. The control mechanisms consist of the control rod which operates the rudder, the rudder control system, as well as auxiliary control equipment for controlling the landing gear, the speed-reduction plate, the ailerons, the regulator plates and the brake system. The engine sound system consists of the turbine sound generator and the jet noise generator.

The Motion System

The overload chair has a composite design which consists of a triangular distribution hydraulic seat and an air-cushion seat; the hydraulic action tube and the air cushion are designed to change the motion and the orientation of the seat and the back according to the laws of motion of the flight maneuvers to give the pilot the sensation of accelerating motion. Solutions to the equations of motion of the aircraft and the control equations of the chair system are obtained by the main control computer. The control signal generated by the computer is amplified to control the motion of the hydraulic action tube and the air cushion to simulate the sensation of overload motion.

Control of the steering rod is accomplished by controlling the force and displacement of the lever. When the steering rod is pulled to its extreme position, the lever force is 10 kg at the maximum moment-arm position and 48 kg at the minimum moment-arm position; when the steering rod is pushed to its extreme position, the lever force is 5 kg at the maximum moment-arm position and 26 kg at the minimum moment-arm position. The moment-arm adjustment equation is a piece-wise linear equation; the real-time solution of this equation is converted to analog signals to drive the bi-directional motor of the control-lever mechanism.

Visual Scenery System

The 6-m spherical screen can be made of either steel-reinforced concrete or fiberglass; the effective field of view is 270° horizontally and 180° vertically.

The image formation of the ground scenery is accomplished by creating a 1/200,000-scale picture of cities, rivers and farmland on the drawing board and recording it on color film, which is then projected onto the spherical screen through a 180° wide-angle lens.

A three degrees-of-freedom projector is used to project the sceneries; it can move in the roll, pitch and yaw directions to simulate changes in the sceneries seen by the pilot as the attitude of the aircraft changes.

The image of the target aircraft is computer-generated, and can be easily changed according to the specified aircraft type. The image can be projected onto the spherical screen at any position; when the target falls outside the field of view, then the computer will control the grating of the projector such that the target disappears from view.

The simulator is also equipped with a terminal display which automatically shows the trajectories of both the controlled aircraft and the target aircraft.

Weapon System

The weapon system consists of the sighting device and the aircraft gun. When the pilot initiates an attack on the target, the simulated sighting ring is controlled to provide an offset angle. By turning the aircraft continuously

so that the center of the ring always coincides with the target, the pilot is in a ready position to fire. If the shell (laser beam) coincides with the target image on the screen after a certain time delay which corresponds to the target distance, then the target is hit.

The strobe frequency of the laser beam is equal to the firing speed of the aircraft gun on a fighter aircraft; hence

the appearance of each laser light on the screen corresponds to the firing of one shell. The sensation of the firing button closely approximates that of the actual firing button.

This simulator can be modified by changing the computer software and hardware to be a single-sphere air combat simulator.

Table 1. Comparison of the Fighter-Aircraft Dome Air Combat Simulator With Similar Foreign-Built Simulators

Item	Single-sphere air combat simulator built by the British Aerospace Corp.	Air combat simulator built by the French Thomson Co.	Fighter-aircraft dome air combat simulator
Cockpit	Fixed	Fixed	Fixed
Spherical screen	Inflated sphere	Fiberglass	Fiberglass
Scenery display	Point source projection	Fish-eye lantern projection	Fish-eye lantern projection
Motion system	Pneumatic overload chair	Pneumatic and hydraulic overload chair	Pneumatic and hydraulic overload chair
Target image	Photograph of target model	Computer generated	Computer generated
Target display	Projector	Projector	Projector
Computer	PDP-11/25 (5 units)	68020 (2 units)	PC (2 units)
Capabilities	Air combat	Air combat	Instrument, acrobatic, formation, shooting and spin flight
Cost	4.5 million pounds	6.8 million francs	1 million yuan

Tribute to the Solid Rocket Propellant Technology Section at the University of Science and Technology for National Defense

91FE0778A Beijing ZHONGGUO DIANZI BAO
[CHINA ELECTRONICS NEWS] in Chinese 5 Jul 91
p 4

[Article by Gong Shenghui [7895 4141 6540] and Wang Mengling [3769 1322 7117]]

[Text] Twelve years ago, the No. 104 Teaching and Research Office of the University of Science and Technology for National Defense consisted of only 36 teaching and research staff working in a poorly equipped office. However, over the past decade, this small unit has completed more than 10 research projects, and has succeeded in developing two missiles and a remotely piloted vehicle. It has received 15 scientific achievement awards at the national level and the ministry level; it has also been rated as one of the most progressive organizations and most progressive Party branch offices for five consecutive years. The success of this office is mainly attributed to the sound leadership provided by the Party Branch Office.

For many years there has been a serious shortage of meteorological data in the altitude range between 30 km and 200 km over China's air space. This deficiency had a significant negative effect on research in military meteorology, aerospace technology and space science. We have been accused by foreign scientists for having left a "permanent void" in this region of air space.

To fill this void, this office was commissioned in 1976 by the State to develop a weather research rocket which could reach an altitude of 70 km and weigh less than 65 kg. This was a difficult task for the research staff because no one had any experience in rocket design, rocket structures, materials or manufacturing techniques; nevertheless, they refused to back down from this challenge. For three years they worked together as a cohesive unit under the leadership of the Party Branch Office; despite harsh and difficult working conditions, they eventually prevailed and succeeded in producing the first batch of weather rockets. However, during flight tests, the rockets broke up in mid-air. Retrieving the wreckage of the destroyed rockets, they went back to the drawing board. After two more years of research and development, the second batch of rockets was ready for flight test at one of the test sites on the northern plains. The first three rockets shot up into the sky without a hitch; however, the fourth rocket exploded and plunged into the ground. The temporary joy of the research team turned into dismay.

At the same time, the project suffered another setback due to severe curtailment of funding. Faced with this difficult situation, members of the Party Branch Office and the design staff jointly decided that the project must go on despite all the obstacles. With no money to purchase new parts or to construct new test facilities, they salvaged parts from junkyards and built test platforms with their own manual labor. Their perseverance and uncompromising scientific attitude finally paid off. In May 1987, flight test of the fourth batch of rockets was conducted and was a complete success. At the certification conference held during the same year, rocket experts unanimously agreed that the standards of the "Zhi

Nu-1" [ZN-1] sounding rocket were comparable to the state-of-the-art standards shared by similar sounding rockets built abroad. One veteran rocket expert complimented the chief designer, Chen Qizhi, by saying: "Your research team has developed a first-class advanced rocket using primitive techniques used by the pioneer U.S. rocket scientist Goddard back in the 1920's."

Success of this project was the combined effort of everyone on the research team. During the past 10 years, the research staff, many of them over 50 years old, worked unselfishly without seeking monetary rewards or recognition. Professors and technicians worked side by side without regard to ranks or positions. Although more than 260 people contributed to the success of the project, only nine names appeared on the list of award recipients.

A special tribute must be paid to the committee members of the Party Branch Office. When it came to fame and recognition, they preferred to stay in the background; on many occasions they requested to have their names removed from the list of award recipients. It was this selfless and sacrificial spirit that provided a bond for the team members. Under the leadership of the Party Branch Office, the research team continued to work together for another three years. In January of this year, a 120-km sounding rocket designed for high-altitude physics research, the "Zhi Nu-3" [ZN-3] was successfully launched from Hainan Island [see JPRS-CST-91-017, 5 Aug 91 pp 8-10].

Aerospace-Related Electromechanical Exports Growth Detailed

91FE0778B Beijing ZHONGGUO HANGKONG
HANGTIAN BAO [CHINA AEROSPACE NEWS]
in Chinese 4 Jul 91 p 1

[Article by Liu Shuli [0491 3219 7787] and Zhang Zhiming [1728 3112 2494]]

[Text] The four-day working conference sponsored by the Aerospace Product Division of the Chinese Electromechanical Product Import/Export Association was concluded in Shanghai on 19 June.

During the conference, the 150 representatives accomplished the following: 1) summarizing and reviewing the work done by the association during the past year; 2) planning and assigning the major tasks for the coming year; 3) establishing and revising the scope of business activities of the individual import/export corporations. This conference played an important role in further expanding the work of the association and in promoting the export of electromechanical products.

The minister of aerospace industry, Lin Zongtang, presented a plaque to the conference with a letter of personal greetings. The keynote speech, which was given by chief engineer Zhang Hongyan, is summarized below.

Since the start of the Seventh 5-Year Plan, exports of aerospace-related electromechanical products have been

growing at an annual rate of 74 percent, reaching a total export volume of over \$700 million. During this period, significant changes have also taken place in product structure and market structure, as well as in the production system.

While these results were encouraging, they did not meet the Party Central Committee and the State Council's expectations that electromechanical products would become a major force in China's exports. In particular, there is still great export potential in the high-technology, high added-value production units of the aerospace industry that need to be developed. Our export goal for this coming year is to break last year's record of \$300 million and to reach the \$400-million level; we also hope to achieve a growth rate of \$100 million per year during the Eighth 5-Year Plan.

Since the beginning of 1991, China has implemented a new policy regarding the exportation of electromechanical products. Under this new policy, the association will play a critical role in foreign trade as a coordination, management and service organization. In order to protect the interests of the state and the aerospace industry, to establish an orderly export procedure for electromechanical products, and to ensure continued export growth, all government officials are urged to give their full support to the association.

This reporter has learned at the conference that during the coming year, the association will make a concerted effort to establish an orderly electromechanical-product export procedure, to expand international markets, and to provide coordination and consulting services in such areas as pricing, market survey, client information. At the same time, it will try to strengthen its own organization, improve its operating efficiency and quality of service to better position itself for further contributions to the goal of expanding foreign trade as part of the Eighth 5-Year Plan.

Representatives at the conference also heard a speech given by the president of the National Electromechanical Product Import/Export Association, Mr. Tang Zhongwen.

Feature on Jian-8 II Fighter's Chief Designer, Design History of Various Jian Models

91FE0778C Beijing ZHONGGUO HANGKONG
HANGTIAN BAO [CHINA AEROSPACE NEWS]
in Chinese 4 Jul 91 pp 1, 3

[Article by Zhou Rixin [0719 2480 2450]]

[Text] [Photo caption] Comrade Gu Songfen [7357 6139 5358], 61, vice chairman of the Science and Technology Committee of the Ministry of Aerospace Industry (MAS), deputy director of MAS's Science and Technology Research Institute, and senior research engineer.

Comrade Gu is a Chinese-educated aircraft designer. After graduating with honors from the Jiaotong University in Shanghai in 1951, he was assigned to work in Shenyang. Subsequently, he was involved in many research and design projects in aeronautics, and was in charge of the design of more than 10 fighter aircraft. He made a number of significant contributions to aeronautical research, and eventually became one of China's celebrated aircraft designers. The CJ-6 training aircraft, designed under his leadership, received a National Gold Medal. The Jian-8 fighter aircraft for which he was the chief designer received a special national award for technical excellence.

In 1984, Comrade Gu was given the prestigious title of "National-Level Authority for His Outstanding Contributions." On the eve of the 70th anniversary of the Chinese Communist Party, his biography was published on the second page of GUANGMING RIBAO under the special column "Tribute to Outstanding Party Members and Experts." [end of photo caption]

In June 1989, at the 38th International Aeronautical and Aerospace Exposition in Paris, China unveiled for the first time its new high-altitude, high-speed fighter aircraft, the Jian-8 II. This fully equipped aircraft attracted thousands of visitors and became big news at the exposition. The chief designer of this new fighter aircraft was Comrade Gu Songfen.

China's aeronautical industry began after the birth of the People's Republic; it had a very weak foundation left by the pre-revolution government. In April 1951, the Central Military Affairs Commission and the State Council issued a directive on "Guidelines for the Development of China's Aeronautical Industry" and established the Administrative Commission for Aeronautical Industry and the Bureau of Aeronautical Industry.

In the summer of that year, the 21-year-old Gu Songfen graduated from the Department of Aeronautical Engineering of Jiaotong University in Shanghai, and reported for work at the Bureau of Aeronautical Industry in Shenyang. This was the period of China's First Five-Year Plan when the aeronautical industry experienced substantial growth. Excellent opportunities existed for Gu to learn and to gain practical experience; in a short time he was able to carry out tasks on his own. In July 1954, he participated in preparing the design plan for China's first airplane, the CJ-5; in July 1956, he contributed to the design of China's first jet fighter, the Jian-5. At that time, his duties at the Shenyang Aircraft Plant included planning administration and static testing.

As China's aeronautical industry evolved from a repair-oriented industry to a manufacturing-oriented industry, the state wisely decided to include funds for aeronautical research in the development budget. In 1956, a decision was made to build China's first aircraft design facility—the No. 1 Design Institute. At that time, China's handful of aeronautical scientists all converged here; they included design experts returning from overseas such as

Xu Xunshou, Huang Zhiqian, Lu Xiaopeng, and the Soviet-trained scholar, Ye Zhengda. Gu Songfen was among the engineers chosen to work at the No. 1 Design Institute; he happily accepted this assignment which was located at the Shenyang Aircraft Plant.

The first assignment Gu received as leader of the Aerodynamics Group was to design a jet fighter/training aircraft, the "Jian Jiao-1," which was needed to train the anticipated large number of jet fighter pilots. The Jian Jiao-1 design project was a huge challenge for Gu Songfen and for the design team whose average age was only 22. The theory of propeller airplanes which Gu learned in school no longer applied; to acquire new knowledge on jet aircraft design, he humbly consulted veteran experts and available textbooks on the subject. For example, to solve the aerodynamic design problem of the two side inlets, he repeatedly visited Professor Zhang Guilian at the Beijing Aeronautical Institute; to address the problem of optimum configuration of wing and tail placement, he consulted Professor Ma Mingde at the Harbin Military Engineering Institute. He also personally took part in a large number of tests and talked to the pilots to learn about actual in-flight conditions; finally, the aerodynamic design for the Jian Jiao-1 aircraft was completed. The design was reviewed by experts at the Soviet Central Fluid Dynamics Institute, who rated its aerodynamic performance as meeting or exceeding design specifications. On 26 July 1958, the Jian Jiao-1 aircraft which was completely designed and built by Chinese engineers had its maiden flight.

In the early 1960's, China experienced temporary economic difficulties; however, in the interest of long-range development of the aeronautical industry, the state decided to proceed with its plan of establishing the Aeronautical Institute and a number of special design institutes. Gu Songfen became a key technical member of the newly established Shenyang Aircraft Design Institute. Armed with experience of having designed two successful aircraft during the "Great Leap Forward" era, he was now in a position to develop a new fighter aircraft.

In the mid 1960's, the state decided to develop China's own high-altitude, high-speed fighter aircraft—the Jian-8. Key military generals and high government officials all had high expectations for this new aircraft. Gu Songfen was named the associate chief designer for the project in charge of aerodynamic design.

In order to arrive at the optimum aerodynamic configuration, Gu and his team members examined many different design options, analyzed large amounts of wind-tunnel data and technical data from actual measurements made on the Jian-7 aircraft. They came up with creative solutions to several key technical problems such as directional stability, design of the horizontal tail configuration, and placement of the focal point of the aircraft.

As Gu Songfen and his design team were working around the clock, transforming their design ideas into engineering drawings, China entered into the era of the "Cultural Revolution." Gu tried to ignore the on-going political conflicts and concentrated on his work. When the design phase and manufacturing phase of the Jian-8 came to an end, he proceeded to prepare a flight test plan by discussing the flight characteristics of the aircraft with the test pilot. However, right at this critical stage of development, he was relieved of his duty and sent to the farms.

On 5 July 1969, the Jian-8 was finally ready for its first flight test. By then Gu had already returned from the "cow sheds," and was very glad to be able to participate in the flight test. At the air field, he watched intensely as the aircraft rolled along the runway and lifted off the ground; the take-off times he measured with a stopwatch were consistent with his theoretical calculations. Twenty minutes later, the aircraft safely landed on the runway; the first flight test was a complete success.

During the next 10 years, China underwent a period of political turmoil, and subsequent flight tests were often interrupted. In the meantime, Gu devoted his energy only to his job as a design engineer; he continued to maintain an uncompromising scientific attitude, carefully analyzing every technical problem and taking each problem one step at a time.

On one day in May 1978, Gu was seen flying in a supersonic training aircraft with test pilot Lu Mindong, chasing after a Jian-8 aircraft and taking photographs of the flow field behind its tail section. His mission was to discover the cause of flutter which had prevented the Jian-8 from passing final certification. He had made three such flights in the training aircraft, obtaining first-hand aerodynamic data which ultimately provided him with the knowledge to completely eliminate the flutter problem.

At the end of 1979, the Jian-8 design was officially certified. However, Gu Songfen, who by then had been promoted to chief designer, did not stop there; he and his design team immediately began working on the all-weather fighter aircraft Jian-8 I. The key improvements of the Jian-8 I were in the onboard electronic equipment and the fire-control radar. In July 1985, the Jian-8 I design also passed certification. In October of the same year, both the Jian-8 and the Jian-8 I aircraft received special national awards for technical excellence.

In the 1970's, there was a significant change in the development of fighter aircraft around the world: the design emphasis shifted from high speed and high altitude to high mobility at mid and low altitudes. In keeping with this new trend, Gu Songfen made a proposal to develop a high-performance fighter aircraft—the Jian-8 II. In 1980, his proposal was accepted by the state, and Gu was named chief designer for the project by the National Defense Science, Technology and Industry Commission [NDSTIC].

In the evolution from Jian-8, through Jian-8 I, to Jian-8 II, significant improvements were made in the weapons systems, the fire-control systems, the onboard electronic equipment and the engine. The Jian-8 II aircraft has a double side-inlet aerodynamic configuration, an improved radar with longer detection range, and is equipped with different types of weapons; it has all-weather-intercept capability as well as the capability to attack ground targets. Its combat performance is the most advanced of all fighter aircraft built in this country.

As the overall chief designer for the project, Gu Songfen organized four design groups with clearly defined responsibilities: the model design group, the system design group, the head design group, and the administrative design group. Under Gu's leadership, the design of the Jian-8 II proceeded in 1982 in an orderly manner at the Shenyang Aircraft Institute; by May 1983, all engineering drawings were completed. In June 1984, the first flight test of the new aircraft was successfully conducted, and in October 1988, its design was officially certified.

Today, the Jian-8 series of fighter aircraft are widely deployed at Air Force bases around the country to provide a "Great Wall in the sky" against invaders.

As a patriot, a dedicated aeronautical engineer, and an admirer of the Communist Party, Gu Songfen submitted his application to become a Party member back in 1959. In March 1983, his wish was finally granted, and he officially joined the Communist Party. After joining the Party, he became even more dedicated to the cause of developing China's aeronautical industry. Today, even though already in his golden years, he still holds positions of deputy director of MAS's Science and Technology Institute and vice chairman of MAS's Science and Technology Committee, and continues to make contributions to the development of aeronautical science and technology.

Model-Rocket Micro Solid Rocket Engine Developed

91P60274 Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 15 Aug 91 p 1

[Article by Wang Hanlin [3769 5060 2651]: "Rocket-Model Special-Purpose Micro Engine Developed"]

[Summary] It has been learned from the Young People's Space Science & Technology Summer Camp opening ceremony held on 12 August that Chinese engineers have developed a model-rocket special-purpose solid micro-rocket engine, which was successfully launched for the first time on 15 August. This model-rocket engine, developed by specialists from Ministry of Aerospace Industry Institute 41, has passed tests certifying that it meets the International Aeronautical Federation's rigorous production standards as well as mil-spec quality standards; it is a high-safety, high-reliability product. The summer camp, organized by the Chinese Society of

Astronautics, is designed to encourage youth to take an interest in and pursue careers in space science and technology.

Hybrid Adaptive Control of Space Station

91FE0824A Beijing YUHAN XUEBAO [JOURNAL OF CHINESE SOCIETY OF ASTRONAUTICS] in Chinese No 3, Jul 91 pp 31-38

[English abstract of article by Bao Pingan and Zhang Zhongjun of Shanghai Jiaotong University; MS received 26 Dec 89]

[Text] The left factorization model of transfer function matrix for a two-panel space station is derived. Based on this model, a pole-assignment hybrid adaptive control scheme for the station has been proposed and illustrated to be effective and robust through computer simulation results.

Combustion Mechanism of Composite Solid Propellant With Negative Pressure Exponent

91FE0824B Beijing YUHAN XUEBAO [JOURNAL OF CHINESE SOCIETY OF ASTRONAUTICS] in Chinese No 3, Jul 91 pp 43-51

[English abstract of article by Yin Jinqi, Li Baoxuan, Wang Kexiu, and Chen Buxue of Northwestern Polytechnical University; MS received 11 Dec 89, project supported by NSFC]

[Text] To study the combustion mechanism of an AP-PU composite solid propellant with a negative pressure exponent, three types of sandwiches with or without an additive, calcium carbonate were prepared. Laser-shadow high speed cinephotomicrography was used to study the burning process of sandwiches and to determine the burning rates. The sandwich surfaces quenched by rapid depressurization were examined by SEM. The compositions and covering of molten binder over the AP crystal surface on the burned surface of the propellant were determined by means of X-ray photoelectron spectroscopy. Following results were obtained: During combustion of the propellant, the additive CaCO_3 enhances burning rate of AP at low pressure (<1.96 MPa) and depresses it at high pressure (>1.96 MPa). CaCO_3 reacts with AP to produce the final product CaCl_2 and promotes melting of AP on the burning surface. The concentration of CaCl_2 on quenched surface increases with increasing pressure. There are coverings of molten binder over the AP crystal surface on the quenched surface not only at the mesa pressure regime, but also at

no mesa pressure regime. The covered area fraction of AP crystal surface increases with increasing pressure. Based on the experimental results, the combustion mechanism of the negative pressure exponent propellant is discussed in this paper.

Study on New Type of Heat-Resistant Electroconductive Polymer Composite

91FE0824C Beijing YUHAN XUEBAO [JOURNAL OF CHINESE SOCIETY OF ASTRONAUTICS] in Chinese No 3, Jul 91 pp 52-57

[English abstract of article by Zhang Mingqiu, Zeng Hanmin, and Cai Qinghua of Zhongshan University; MS received 12 Jan 90]

[Text] PES-C (polyarylethersulfone with cardo group) is a sort of high-performance engineering plastic. The electroconductive composites comprised of PES-C, carbon fiber and carbon black exhibit remarkable conductivity and heat-resistivity. In this paper, the filler content-resistivity relation, resistance-temperature relation, voltage-current characteristic and electrothermic property of this sort of composite material are discussed.

Elastostatic Analysis of Laminated Composite Nozzles

91FE0824D Beijing YUHAN XUEBAO [JOURNAL OF CHINESE SOCIETY OF ASTRONAUTICS] in Chinese No 3, Jul 91 pp 99-104

[English abstract of article by Zhu Runxiang, Yan Cong, Jiang Jinqing, and Zhang Duo of Northwestern Polytechnical University; MS received 20 Jan 90]

[Text] An elastostatic analysis of nozzles which are made of laminated composite with carbon/carbon or carbon/silicone material and subjected to combination of axisymmetric and asymmetric loading is presented. The finite element procedure with complex Fourier transformation makes this 3-D problem an approximate 2-D one. The following assumptions are used: (1) The axial and transverse shear moduli are taken to be equal; (2) the transversely isotropic medium is assumed to be incompressible, the material matrix can be determined by two moduli coefficients and one Poisson's constant in the layer. Solutions are shown for typical rocket nozzle subjected to the combination of the internal pressure and the concentrated forces.

The approach presented can be worth recommending for analysis of laminated nozzles and other similar structures.

Military To Receive Modern Electronics

40100073A Beijing CHINA DAILY in English 9 Aug 91
p 2

[Article by staff reporter Wu Yunhe]

[Text] China will pin its hopes on a newly-established syndicate to equip the nation's military with modern electronics products in the next five years, a senior official said yesterday.

The China Electronics Industry Corporation, which was established two months ago as a way to promote growth in the nation's electronics industry, convened its first national working conference in Beijing yesterday to plan the overall development of its military-related electronics industry.

Zhang Xuedong, general manager of the corporation, told the opening session that a nationwide effort must be made to work out a plan for the development of electronic devices for the military in the 1991-95 period.

He Guangyuan, minister of Machine-building and Electronics Industry, echoed the call by urging participants at the six-day conference to help develop the programme.

The central government is concerned about the level of the nation's electronics systems which "is way behind that of Western countries," He said, recalling the success of hi-tech weapons during the Gulf war.

The newly formed syndicate is in control of nearly 200 leading electronics producers, 50 research institutes, seven colleges and dozens of business and service companies, with a workforce of 370,000.

Zhang also introduced his development blueprint for the industry's next five years.

It includes more effort in the research and development of advanced technologies and a new generation of products with large-scale integrated circuits as the core and basic electronics devices and components as principal parts.

The corporation will pool its strength to develop micro-electronics technology, computers, communications, and sensors, which would facilitate the wide application of electronics products in the military as well as in the national economy in the next five years.

Zhang added that by 1995, the output value of the corporation should reach 27 billion yuan (\$5.1 billion), sales would reach 24.3 billion yuan (\$4.6 billion), and pre-tax profits would reach 2.7 billion yuan (\$509 million).

The corporation is also working to export a total of 2.7 billion yuan goods in 1995, he added.

The corporation's strategic policy is to involve itself in international competition, he said.

Zhang disclosed that his corporation is drafting a detailed export-oriented programme, including the setting up of a global sales and service network, and plans to send its employees overseas for training to bring out a generation of young business people, well-versed in foreign trade.

The general manager predicted that the demand for military and civil products would be great, estimated at about 100 billion yuan (\$18.9 billion) in fixed assets during the 1991-95 period.

Tank-Oriented Silicon Interference Suppressor Reverse Engineered

91P60235 Wuhan HUAZHONG LIGONG DAXUE
XUEBAO [JOURNAL OF HUAZHONG (CENTRAL
CHINA) UNIVERSITY OF SCIENCE AND
TECHNOLOGY] in Chinese Vol 19 Suppl 1, Apr 91
p 22

[Unattributed article: "Silicon Interference Suppressor Developed by This University Passes Appraisal"]

[Summary] In December 1990, the "silicon interference suppressor" developed by scientists in the Semiconductor Teaching & Research Laboratory of this university's Solid-State Electronics Department passed the appraisal organized by the Hubei Province Electric Industrial Corporation, at which its structural and electrical indicators were judged to have met contract specifications and to match international state-of-the-art values. This device was specially developed for "Project 37 [san qi]" involving domestic production of the Type 80 [main battle] tank. The scientists and engineers, starting their research with a sample of a product manufactured by the U.S. GE Corporation and without any technical reference data, over a 2-year period gradually worked out the technology to produce this electronic device, oriented toward a higher percentage of domestic manufacture of the Type 80 tank.

This device effectively suppresses peak voltages with bias-controlled regulated-voltage characteristics and surge voltages in various operating conditions; it is therefore ideal for providing more highly regulated voltages and lower fault rates in the power supplies of modern tank fire-control and automatic-targeting computers. The device has been incorporated into the Ministry of Armaments Industry's Plant 218 assembly line after having been tested for 2 years in various design-finalization trials at state target ranges.

In addition to further military applications in combination with other non-linear elements, this interference suppressor can be used in spacecraft computer systems and in civilian areas such as NC machine tools.

Baicheng Weapons Testing Facility Introduced

91P60244 Shijiazhuang HEBEI RIBAO in Chinese
8 Jun 91 p 4

[Text] After 5 years of technical reforms, the Baicheng weapons testing range has gone from being an infantry and ground artillery testing range to a modern, comprehensive conventional weapons testing base for the ground, naval, and air forces; it has significantly enhanced China's ability to test and finalize conventional weapons and equipment.

Situated in the Horqin grasslands, Baicheng was China's first conventional weapons testing range when it was built in 1954. In the last few years, in order to adapt to the nation's conventional weapons development, the range was upgraded through the use of high technology and new techniques, and measurement techniques and the standard to testing have continued to improve. Today, the range is capable of handling all types of

conventional ground weapons such as artillery, tanks and combat vehicles, tactical missiles, and radar control systems as well as conventional weapons of the naval and air forces.

The main portion of Asia's most advanced large-scale simulated environment facility has now been completed. It is capable of conducting tests on various types of weapons under comprehensive weather conditions representing extremes in temperature, high humidity, and solar radiation, etc.

The range can handle indoor firing of large-caliber artillery involving heavy concussion and a lot of smoke. The base commander states that the Baicheng base is now officially open to foreigners and can conduct tests on foreign-made conventional weapons under actual combat conditions. The range is also equipped to design target ranges and train range personnel for foreign interests.

New Aerospace-Oriented Al-Li Alloy Developed

91P60265A Beijing ZHONGGUO KEXUE BAO
[CHINESE SCIENCE NEWS] in Chinese
2 Jul 91 p 2

[Article by Song Dezhong [1345 1795 1813]: "High-Strength, Lightweight Domestically Made Aluminum-Lithium-1 Alloy"]

[Summary] Shenyang (ZHONGGUO KEXUE BAO wire report)—A new domestically made aerospace-oriented material, "Aluminum-Lithium-1" (Al-Li-1) alloy, developed by the CAS Institute of Metals Research

and the Changchun Institute of Applied Chemistry has passed appraisal. This new-generation Al-Li alloy, about 10 percent lighter than conventional Al-Li alloys, has much higher specific strength and modulus of elasticity. Developed over a three-year-plus period, Al-Li-1 has demonstrated a performance matching the international state-of-the-art; moreover, the manufacturing process has been simplified, and cost is lower than that of the foreign-made product. Experts from NDSTIC, MAS's Nonferrous Metals Corp., and various scientific research institutes have urged that the state provide R&D funds to encourage continued production of this world-class aerospace alloy to meet the domestic need.

Genetically Engineered Typhoid Vaccine

91P60272 Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 10 Jul 91 p 1

[Article by Li Xigen [2621 0823 2704]]

[Summary] A highly effective bivalent typhoid vaccine has been developed by the Biotechnology and Molecular Genetics Institute of the Second Military Medical University. The vaccine was obtained by transferring typhoid VI antigen gene into attenuated *Salmonella typhimurium*, which is capable of protecting against typhoid fever and mouse typhus simultaneously. It is reported that the vaccine has a higher protection rate than that produced abroad and is the first bivalent vaccine in the world. The freeze-dry technique and its oral preparation will lower the price and make it the most promising vaccine in China.

Automated Gene Augmentor Developed

91P60245 Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 18 Jun 91 p 4

[Article by Zhang Shi [1728 4258]]

[Summary] The first Chinese-designed computerized gene augmentor has been developed by the Institute of Radiological Medicine of the Academy of Military Medical Sciences and the Beijing Institute of New Technology Application. The new instrument has passed technical certification and a Chinese patent has been granted. Today, 25 of these augmentors are being used for genetic engineering and bioengineering research, disease diagnosis, animal and plant quarantine projects, investigations by research institutes and universities, and medical treatment units. The instrument is composed of three constant-temperature water baths and microcomputer-controlled machines. It is competitive with foreign-imported augmentors and has improved features such as shorter augmentation cycles, a high level of automation, and low cost.

Preparation and Characterization of Monoclonal Antibodies Against Recombinant Human Tumor Necrosis Factor α

40091016A Beijing SHENGWU GONGCHENG XUEBAO [CHINESE JOURNAL OF BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91 pp 132-136

[English abstract of article by Li Yan [7812 3601], Zhao Weiwei [6392 5633 5633], et al. of the Institute of Basic Medical Sciences, Academy of Military Medical Sciences, Beijing]

[Text] Tumor necrosis factor (TNF α) plays an important role in cytotoxicity and inhibition of tumor cells. Further

studies on the structure, function and clinical application of TNF α will be useful. Nine clones of hybridoma secreting monoclonal antibodies against rHTNF α were obtained by using cell fusion technology. None of the monoclonal antibodies cross-reacted with rIL-1, rIL-2, rIFN γ , IFN α_1 , and *E. coli* lysates. Western blot demonstrated that they specifically recognized rHTNF α antigen of M. W. 17000 daltons. Some of the antibodies recognized native rHTNF α , too. These antibodies neutralized the cytotoxicity of rHTNF α to different extents. They will be utilized as immunoaffinity column to purify rHTNF α from recombinant *E. coli* lysates.

Studies on Fusion Breeding of Protoplasts From Antibiotic-Producing Strain 5102. IV. Verification of Fusant FR-008, Isolation and Characterization of Its New Antimicrobial Substance

40091016B Beijing SHENGWU GONGCHENG XUEBAO [CHINESE JOURNAL OF BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91 pp 142-147

[English abstract of article by Yuan Dejung [5913 1795 6511] and Zhou Qi [0719 0796] of the Agricultural Antibiotic Laboratory, Huazhong Agricultural University, Wuhan. This investigation received financial support from the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR).]

[Text] Based on high performance liquid chromatography (HPLC) scrutiny of Antibiotic 5102-1, the principal components of Antibiotic 5102-1, which are active in the inhibition of *Pellicularia sasakii* and able to produce typical abnormal branches, have been isolated from the starting strain 10-22 and the fermented product of fusant FR-008. The result further verifies that FR-008, of which the aerial hyphae and cultural characteristics are not exactly the same as those of the starting strain, is a recombinant of intraspecific fusion of *Streptomyces hygroscopicus* var. *yingchengensis*. In the experiment, a new antimicrobial substance had been isolated and purified from the fermented product of fusant FR-008. The substance shows a color of dark blue when reacted with concentrated sulphuric acid and concentrated hydrochloric acid and displays an absorption peak at 403, 380, 360, 340 nm respectively in the UV-VIS absorptions. These characteristics indicate that it is a kind of heptaene macrolide antibiotic. In the process of liquid chromatography for aromatic moiety, this antibiotic is found to contain p-amino-acetophenone moiety. Sample of methanol hydrolysis and hydrolysis of methanol-hydrolysed sample of the antibiotic have been determined by means of amino acid analyser, and are found to contain aminosugar moiety different from that in all the other heptaene macrolide antibiotics. The detailed structure of the aminosugar moiety has yet to be identified in further studies.

The Determination of Glucose With Immobilized Enzyme-Chemiluminescence Analysis and Development of a New Type of Glucose Sensor

40091016C Beijing SHENGWU GONGCHENG
XUEBAO [CHINESE JOURNAL OF
BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91
pp 154-158

[English abstract of article by Zhou Yikai [0719 1355 7030], Wei Shunhe [7614 7311 0735], et al. of Tongji Medical University, Wuhan]

[Text] A new type of glucose sensor based on the determination of glucose with immobilized enzyme-chemiluminescence analysis was presented. The sensor is fabricated with immobilized enzyme membrane, a photodiode and cellulose acetate membrane. Compared with other types of glucose sensor, this proposed sensor has some features, such as high sensitivity, fast response rate and long-term stability in operation. The linear working range is four orders of magnitude, with a detection limit of 0.5 ppm. More than 200 samples can be continuously analyzed and good agreement has been obtained with o-toluidine method.

Semi-Continuous Microcarrier Culture of rCHO Cells Secreting HBsAg by Feeding Microcarriers

40091016D Beijing SHENGWU GONGCHENG
XUEBAO [CHINESE JOURNAL OF
BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91
pp 159-163

[English abstract of article by Chen Zhihong [7115 1807 1347], Shi Yuan [2457 3293], and Ding Jianchun [0002 0256 2797] of the Biochemical Engineering Institute, East China University of Chemical Technology, Shanghai]

[Text] On the basis of culturing rCHO cells semi-continuously on constant concentration of microcarriers, the cell yield and HBsAg expression were increased by feeding microcarriers step by step. The process for culturing rCHO cells semi-continuously to secrete HBsAg was established. The foundation has been laid for culturing rCHO cells continuously to reach high cell yield and high HBsAg expression.

A Rapid and Simple Method for the Synthesis of Peptide Gene

40091016E Beijing SHENGWU GONGCHENG
XUEBAO [CHINESE JOURNAL OF
BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91
pp 180-183

[English abstract of article by Gan Keda [1626 4430 6671] and Chen Changqing [7115 1603 1987] of Shanghai Center of Biotechnology, Academia Sinica, Shanghai]

[Text] A rapid and simple method for the synthesis of peptide gene was described through the synthesis of Lys3-trichosanthes trypsin inhibitor-I (Lys3-TTI-I) gene as an example. The TTI-I is a new trypsin inhibitor purified from *Trichosanthes* and composed of 27 amino acid residues with three pairs of disulfide bonds. A 108 nucleotide fragment was synthesized by a DNA synthesizer. This synthetic 108 mer is negative strand of Lys3-TTI-I gene including the coding region, the initiation codon ATG and the double stop codon TAG TAA. It also has a BamHI recognition sequence on the 5' end and a 10-nucleotide palindromic sequence encompassing a HindIII cleavage site on the 3' end, so that it can be directly converted to double-stranded homoduplex form by mutually primed extension with Klenow fragment. The double-stranded homoduplex was successively cleaved by BamHI and HindIII and then cloned into plasmid pUC19. Finally, through screening bacterial colonies the cloned gene was obtained and the DNA sequence was proved to be correct by dideoxy DNA sequencing with 5'-labeled oligonucleotide primers.

Liposome Mediated Transformation of Streptomyces Chromosomal and Plasmid DNA

40091016F Beijing SHENGWU GONGCHENG
XUEBAO [CHINESE JOURNAL OF
BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91
pp 184-187

[English abstract of article by Xu Xiaoxue [1776 1420 7185], Zhang Tinglan [1728 1656 5347], and Zheng Youxia [6774 1635 7209] of the Shanghai Institute of Plant Physiology, Academia Sinica, Shanghai; project supported by the National Natural Science Foundation of China]

[Text] This paper reports that L- α -phosphatidylcholine and stearylamine (ratio 20:1 (wt/wt)) as lipid film encapsulated *S. lividans* plasmid pIJ303 and *S. qingfengmyceticus* chromosomal total DNA respectively and transformed *S. lividans* 1326 and *S. qingfengmyceticus* A544 protoplasts in the presence of 50 percent PEG1000. Transformation frequencies increased 35.91-207 times and 8.7-18.4 times higher than that of conventional transformation for liposome-pIJ303 DNA and liposome-chromosomal DNA respectively, besides, liposome encapsulation can protect DNA from the nuclease degradation. There is no significant effect of different liposome surface charge on transformation of *S. lividans* 1326 protoplast.

Extraction of Microbial Intracellular Substances by Laser Technology

40091016G Beijing SHENGWU GONGCHENG
XUEBAO [CHINESE JOURNAL OF
BIOTECHNOLOGY] in Chinese Vol 7 No 2, May 91
pp 192-194

[English abstract of article by Li Zuyi [2621 4371 5030], Shi Jiliang [0670 3444 5328], et al. of the Shanghai Institute of Organic Chemistry, Academia Sinica, Shanghai]

[Text] After high intensity laser irradiation, some microbial intracellular substances (e.g., nucleotides) were obtained. This laser technology was superior to other cell disintegrated methods, such as sonic disintegrator, freezing and thawing, French pressing, lysozyme and treatment with perchloric acid. Effect of irradiation time, cell concentration and laser power density on mortality of cells and yield of nucleotides was studied. With the increasing of irradiation time, the mortality of cells and the concentration of nucleotides exuded out of cells increased. Under certain cell concentration and laser power density (1.25-2.50 J/cm²), the yield of nucleotides was high.

Interaction of Cytotoxin MT-B and Lipid Vesicles

40091016H Shanghai SHENGWUHUAXUE YU SHENGWUWULI XUEBAO [ACTA BIOCHIMICA ET BIOPHYSICA SINICA] in Chinese Vol 23 No 3, May 91 pp 183-188

[English abstract of article by Zou Zhiyang [6760 1807 2254] and Wang Jingying [3076 7234 5391] of the Shanghai Institute of Biochemistry, Academia Sinica]

[Text] The emission fluorescence intensity of cytotoxin MT-B from *Naja naja atra* increased upon addition of phosphatidic acid (PA) vesicles due to the binding of protein with lipids. No blue shifts were observed. The maximum fluorescence intensity was reached as soon as MT-B bound with saturating amounts of PA. The MT-B to PA molar ratio at saturation binding was 1:4. This value for the molar ratio was not influenced by the presence of phosphatidyl-choline (PC). All acidity constant pKa of tyrosyl residues of pure MT-B were determined by pH titrations and were found to be 9.3. But the pKa values of MT-B in complexes were altered to give two 6.5 and one 9.5. Fluorescence quenching experiments of MT-B revealed that quenching efficiency of acrylamide appeared to be decreased dramatically in the presence of lipid. ³¹P NMR studies of the vesicles of mixed PA and PC showed that the chemical shift of PA changed, while that of PC remained the same after combining with MT-B.

Glucose Micro-Enzyme Sensor Based on Cobalt Porphyrin Modified Microdisk Array Carbon Fiber Electrode

40091015H Shenyang YINGYONG HUAXUE [CHINESE JOURNAL OF APPLIED CHEMISTRY] in Chinese Vol 8 No 3, Jun 91 pp 86-88

[English abstract of article by Feng Lianyu [7458 6647 3768], Che Guangli [6508 1639 4409], et al. of the Laboratory of Electroanalytical Chemistry, Changchun Institute of Applied Chemistry, Academia Sinica, Changchun 130022; project supported by the National Natural Science Foundation of China]

[Text] A cobalt tetraphenyl porphyrin modified microdisk array carbon fiber electrode has been prepared,

which showed a catalytic activity for oxygen reduction through linear voltammetry. A glucose microenzyme electrode has been made based on the modified microelectrode by immobilizing glucose oxidase. The upper detection limit of the microsensor was 2.4 mmol/L. The response took 40 seconds with satisfactory selectivity. The sensor held linear up to 13 mmol/L in use for amperometric detection in the flow injection analysis.

Chromosomal Localization of Human X Chromosome Alphoid Satellite DNA by in Situ Hybridization and Its Preliminary Application

40091015G Beijing ZHONGGUO YIXUE KEXUEYUAN XUEBAO [ACTA ACADEMIAE MEDICINAE SINICAE] in Chinese Vol 13 No 3, Jun 91 pp 203-207

[English abstract of article by Qiu Hongchen [5941 1347 3819], Liu Fengxi [0491 7685 0823], et al. of the Institute of Basic Medical Sciences, Beijing]

[Text] In situ hybridization of human X chromosome-specific alphoid satellite DNA to human lymphocyte metaphase and interphase nuclei was carried out. The results showed that the probe hybridized with high specificity to the centromeric region at p11 → q11 of the X chromosome. The number of silver grain clusters in the interphase nuclei was correlated with that of X chromosomes in the cells. Forty-four percent of the clusters were located near the nuclear membrane, the usual location of X chromatin (Barr body). The hybridized chromosomes were also R-banded with BrdU treatment, and the significance of this work was briefly discussed.

A Study on Treatment of Epidemic Hemorrhagic Fever With Specific Transfer Factor

40091015F JIEFANGJUN YIXUE ZAZHI [MEDICAL JOURNAL OF CHINESE PEOPLE'S LIBERATION ARMY] in Chinese Vol 16 No 3, Jun 91 pp 178-180

[English abstract of article by Liu Xizhen [0491 1585 4176], Tao Zengguang [7118 1073 3798], et al. of the Military Medical Institute of Shenyang Command, Shenyang]

[Text] Pigs were immunized with 76-118 strain of EHFV and specific transfer factor (STF) was prepared. Its clinical effect was observed in 62 early cases of epidemic hemorrhagic fever (EHF). The STF group (STF + combined treatment) comprised 37 patients, and the control (combined treatment) comprised 25 patients. The comparability of the two groups was good. The clinical results proved that STF plus combined treatment could improve the cellular immune function of EHF patients, and had the effects of lowering of fever, facilitating the recovery of platelet count to normal, decreasing hemorrhagic tendency and preventing kidney lesion. Its effects in promoting over-phase and shortening of disease course were even more remarkable.

Comparative Studies on Antigenicity of Different HFRS Virus Strains With Cross Plaque Reduction Neutralization Test

40091015E Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 3, Jun 91 pp 162-164

[English abstract of article by Yu Yongxin [0205 3057 2450], An Qi [1344 4388], et al. of the National Institute for the Control of Pharmaceutical and Biological Products, Beijing]

[Text] Antigenicity of 13 virus strains of HFRS [Hemorrhagic Fever Renal Syndrome] Virus isolated from different places in China and Korea were studied with PRNT [plaque reduction neutralization tests]. The results indicated that viruses isolated from Apodemus could be classified as serotype 1 and those from Rattus as serotype 2. Differences among viruses within the same serotype suggested that subtype might exist.

We have discovered two strains (Gou and R₂₂) which have shared the common antigens with almost all virus strains of the both serotypes.

Three strains, now used for making experimental inactivated vaccine, showed good cross reactivity with homoserotypic viruses, however very low or no reactions with most heteroserotypic strains. The results suggest that bivalent vaccine should be constructed with both serotype viruses or virus strain with broad antigenic spectrum.

Studies on the Oral Immunization of Animal With Engineered CT-B Plus Whole Vibrio Cell Vaccine (BS-WC)

40091015D Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 3, Jun 91 pp 158-161

[English abstract of article by Liu Chuanxuan [0491 0278 2537], Ma Qingjun [7456 3237 6874], et al. of the Institute of Biotechnology, Academy of Medical Sciences, Beijing]

[Text] We have reported the results of oral immunization of animals with a "complex vaccine" of engineered CT-B (Cholera Toxin- β subunit) plus whole Vibrio cell vaccine (BS-WC). The LACA mice which received i. p injection of BS-WC vaccine can protect from CT or V. Cholerae challenge. The protective efficacy is 100 percent for CT and 93 percent for V. Cholerae. The protective efficacy of guinea pig which received three doses of BS-WC via oral route followed by challenge with Eltor V. Cholerae is 91.7 percent. To immunize rabbit with BS-WC via oral route, the protective efficacy shown in the ileal loop assay is 82.4 percent for CT, 82.4 percent for classical V. Cholerae and 94.1 percent for Eltor V.

Cholerae. Both CT and vibriocidal antibodies can be detected in the sera of rabbits. The results of the ileal loop assay is consistent with those of serological tests.

Selection of Virus Strain for the Production of Inactivated EHF Vaccine

40091015C Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 3, Jun 91 pp 155-157

[English abstract of article by Zhu Zhiyong [2612 2535 0516], Tang Hanying [0781 3352 5391], et al. of the Zhejiang Health and Anti-Epidemic Station, Hangzhou]

[Text] This paper describes the selecting process of the seed virus for production of inactivated EHF [epidemic hemorrhagic fever] vaccine. Five strains of EHF virus which gave higher antibody response in infected rabbits were chosen for this study. After several passages in Meriones unguiculatus (Mu) kidney cell cultures or in suckling mouse brains, the virus titer was compared. The hemagglutinin titer of the supernatant from infected Mu kidney cell cultures was also determined. It was found that the vaccination effect was correlated well with the quantity of the hemagglutinin present on the vaccine.

Studies on the Mechanism of Formation of P. cocovenenans Toxin—Bongkrekcic Acid

40091015B Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 3, Jun 91 pp 151-154

[English abstract of article by Chen Weizhen [7115 5898 4176], Meng Zhaohe [1322 2507 6378], et al. of the Institute of Nutrition and Food Hygiene, Chinese Academy of Preventive Medicine]

[Text] *Pseudomonas cocovenenans* subsp. *farinofementans* is a new pathogen of food poisoning which is prevalent in many provinces in China. The most important character of the pathogen is to secrete toxin called Bongkrekcic acid. This toxin being derivative of fatty acid is quite different from that of other bacteria on chemical nature.

Five strains of *P. cocovenenans* subsp. *farinofementans* with their own peculiar character were selected as the experimental material. The cellular fatty acid and the amount of toxin are analyzed with Gas Chromatographic Analysis and Thin Layer Chromatography. The results suggest: 1) Cellular fatty acid may play some role on the serotype of the strains; 2) Saturated fatty acid C16:0 and unknown fatty acid X2(0.94) have direct relations with toxin production; 3) Environmental factors may have some influence on the ability of toxin secretion.

Study on the Protective Effect of Group- and Type-Specific Lipopolysaccharide Antigens of *Vibrio cholerae* 01 With Monoclonal Antibodies

40091015A Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 3, Jun 91 pp 147-150]

[English abstract of article by Zhang Shubo [1728 2885 3134], Zhang Jizhong [1728 4949 1813], et al. of the Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine, Beijing]

[Text] Hybridoma cell lines producing monoclonal antibodies against the O-antigens of *Vibrio cholerae* 01 have been established. Reactivities of each McAb were investigated with agglutination test and Western blotting. Six McAbs against A, B or C antigens were selected for the study of their protective effect. These McAbs were mouse IgG₃ and with agglutination titer between 1:1600 to 1:3200.

The protective effect of the McAbs was studied with vibriocidal assay and suckling mouse protection assay. The vibriocidal titer of anti-A McAbs was 1:409600 to both Ogawa and Inaba; to Ogawa by anti-B McAbs was 1:409600; and to Inaba by anti-C McAbs was 1:25600 and 409600. The PD₅₀ of protection assay of anti-A McAbs was 3386.8 and 6977.7 units per ml when challenged with Ogawa, while challenged with Inaba the PD₅₀ was 4370.6 and 5284.7 units per ml. The PD₅₀ of anti-B McAbs was 1278.3 and 6413.4 units per ml when

challenged with Ogawa while the PD₅₀ of anti-C was 2500 and 4048.6 units per ml when challenged with Inaba.

The results indicate from the agglutination that Ogawa serotype possesses a large amount of both A and B antigens, and small amount of the C antigen; and that Inaba serotype possesses a large amount of A and C antigens, and small amount of the B antigen.

Pharmaceutical Test Base Established in Beijing

91P60236 Beijing BEIJING KEJI BAO [BEIJING SCIENCE AND TECHNOLOGY NEWS] in Chinese 10 Apr 91 p 1

[Article by You Xuetao [3945 1331 7290]]

[Summary] In order to commercialize quickly Chinese biotechnology products, a test base for biotechnology pharmaceuticals has been established at the Beijing Experimental Animal Center of the Beijing Academy of Sciences. The 1,400-square-meter base will aim at the conversion of the biotechnology products by closely following foreign trends in medical applications and put the products into large-scale production. It was reported that in 1992 the test base will start producing highly-purified monoclonal antibodies and diagnostic reagents for such tests as Monoclonal antibody (McAb) immunoassay, radioimmunoassay, enzyme-linked immunoassay (ELISA), and hemagglutination test, which were recently developed by the Beijing Experimental Animal Center. Among the products developed by the center is a high-titer monoclonal antibody, which has been used in preparing hepatitis B immunodiagnostic reagents and has been exported to Thailand and the United States in small batches.

Sino-U.S. Developments Reported

Intel To Supply 386 Chips, Hopes To Purchase Parts

91P60266A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 17, 1 May 91 p 1

[Article by Xuan Gang [1357 0474]: "Intel To Directly Supply 386 Chips to Chinese Plants; Interested in Purchasing Spare Parts From Chinese Mainland"]

[Summary] It has been learned from authoritative sources that the Intel Corp., the world's largest manufacturer of microcomputer chips, recently reached an agreement with the Zhong Dian ["China Electronics"] Group whereby the former would provide its 80386 CPU chips to mainland Chinese computer manufacturers at favorable prices over a long term. Intel will directly provide the chips through its sole mainland Chinese joint venture, the Intel-Zhong Dian joint-stock company called Intel Computer Technology Ltd. (ICT). This move, which will greatly restrict black-market activity in these chips, will furnish 15 domestic computer makers—Great Wall, Langchao, Changjiang, Huanan, Lianxiang [i.e., Legend], and 10 others—with critically needed CPUs for computers to be sold on the domestic and foreign markets.

Intel Assistant Chief Arbiter/Asia-Pacific-Division General Manager Francis Yu (Yu Jionglong) has concluded exploratory talks in China with domestic computer makers and with State Council Vice Premier Zou Jiahua. Intel has also sent a delegation of international purchasing agents to negotiate for purchase of spare parts—microcomputer power supplies, computer housings, printed circuit boards, keyboards, cables, etc.—from mainland Chinese producers.

IBM Has Purchased \$57 Million in Spare Parts

91P60266B Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 3 May 91 p 1

[Article by Liu Keli [0491 0344 7787]: "U.S.'s IBM Corp. Representative Is Full of Hope for Cooperation With China; IBM Has Purchased US\$57 Million in Chinese Computer Spare Parts Over Last Four Years"]

[Summary] At a new-product press conference held by IBM on 23 April in Beijing, IBM officials announced that the giant U.S. computer firm has purchased US\$57 million in computer spare parts from [mainland] Chinese firms over the last four years. IBM's Beijing representative and General Manager Shi Zhiren said that this demonstrates he is very hopeful about the future prospects for the IBM-China cooperation. IBM first purchased high-quality computer parts—power supplies, printed circuit boards, motors, transformers, cables, etc.—from China in 1987. The amount in those days was about \$100,000 per year, but by 1990 the [cumulative] value of computer parts purchased by IBM from China

had risen to \$33 million. In 1991, IBM intends to purchase Chinese-character terminals, monitors, and other peripherals.

Unisys in Joint Venture With MAS

91P60266C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 20, 22 May 91 p 1

[Article by Li Liangyu [2621 5328 3768]: "Another New Development in Sino-U.S. High-Tech Cooperation"]

[Summary] On 12 May 1991 in Beijing, You Hang [0327 5300] (UNIMAC) Computer Systems Ltd., a joint venture recently established between China's Ministry of Aerospace Industry (MAS) and the U.S. computer firm Unisys, formally opened for business. Some 200 officials, including Central Advisory Commission Vice Chairman Bo Yibo and MAS Vice Minister Liu Jiyuan, attended the opening ceremony. MAS first established cooperative relations with Unisys in 1980, and in July 1989 the two parties reached an agreement to form a joint venture to develop systems integration software. In December 1990, the establishment of this new joint venture (i.e., UNIMAC) was formally approved. UNIMAC will produce international-standard and industrial-standard integrated products and software products—especially Chinese-character products—for open computer systems [i.e., OSI-standard systems].

IBM in Software Joint Venture With Shenzhen Firm

91P60266D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 26, 3 Jul 91 p 1

[Unattributed article: "Shenzhen Wan Guo Software Corporation Opens for Business"]

[Summary] The first IBM software joint venture on mainland China—Wan Guo [8001 0948] Software Corp.—opened for business in Shenzhen the other day. MMEI Computer Dept. Director Yang Tianxing [2799 1131 5887] and U.S. Consul General in Hong Kong Wei Liansi [1218 1670 2448] offered their congratulations. Wan Guo, a joint venture of the IBM China/Hong Kong Corp., Shenzhen University's Software Development Corp., and Hong Kong's Dong Ya ["East Asia"] Bank, will primarily engage in development of high-quality software products for the domestic and foreign markets, and will promote increased domestic application of software development technology via imports of advanced IBM equipment.

NCR Installs OCCA Network at Qinghua University

91P60266E Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 27, 10 Jul 91 p 2

[Unattributed article: "NCR Builds China's First Open Cooperative Computing Architecture [Network] at Qinghua University"]

[Summary] Engineers from NCR Corp.'s NCR (China) Ltd. subsidiary recently installed open systems [i.e., OSI] equipment at Qinghua University, and using about 70 UNIX-operating-system computers provided by six Qinghua-University-affiliated suppliers (DEC, Sun, ELXSI, AT&T, Honeywell, and one other firm) the engineers set up the nation's first open cooperative computing architecture (OCCA) network. This network is based on two NCR tower-type 32/600 multiuser computers and incorporates NCR's OCCA slave/server principles. The network uses the TCP/IP [transmission control protocol/internet protocol] communications protocol.

More on IBM Joint Ventures

91P60266F Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 24 Jul 91 p 3

[Article by Liu Keli [0491 0344 7787]: "IBM To Increase Investment in Chinese Software Industry"]

[Summary] At an IBM PS/2 new-product and technologies conference held on 15 July, IBM officials announced that—following upon the firm's first joint venture, based in Tianjin and called Tianjin Advanced Information Products Ltd. (TAIP), set up in August 1990 and capitalized at US\$500,000—the giant computer firm has established a second software joint venture, to be located in Shenzhen. The IBM officials also announced that in the next five years, IBM will further increase its investment in software production on [mainland] China by setting up two additional software joint-venture production plants.

TAIP has already signed contracts for \$100,000 with IBM users at home and abroad and will sign an additional \$300,000 worth of software contracts with foreign nations this year. The new joint venture, Shenzhen International Software Development Ltd. (SISD), capitalized at US\$5 million and formed at the end of last year by IBM, Shenzhen University, and Hong Kong's Dong Ya ["East Asia"] Bank, will market its products in China, Hong Kong, and East Asia. SISD, which opened on 22 June in Shenzhen, includes IBM capital stock valued at \$2.2 million.

Expert System for Satellite Control System Fault Diagnosis Certified

91P60267A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 24, 19 Jun 91 p 15

[Article by Wang Nanhua [3769 0589 5478]: "Expert System Is Tool for Satellite Control System Fault Diagnosis"]

[Summary] The "retrieveable-satellite control system real-time fault diagnosis expert system" developed by the Ministry of Aerospace Industry's (MAS) Institute 502 recently passed the MAS-organized technical appraisal conducted by a panel of experts in the fields of

artificial intelligence, automatic control, and automatic monitoring. This system provides data on faults in satellite attitude control via fault/cause-and-effect network analysis techniques, and can be put on-line with satellite ground TT&C stations. It can also be used to provide control data for other aircraft and spacecraft, and for industrial process control systems such as in chemical engineering and power generation.

5.25-Inch 360KB Double-Sided High-Density FDD Passes Acceptance Check

91P60267B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 28, 17 Jul 91 p 5

[Article by Fang Qixing [2455 6386 5281]: "Model DH505 5.25-Inch 360KB Double-Sided High-Density Floppy Disk Drive Production Design Finalized"]

[Summary] The model DH505 5.25-inch 360KB double-sided high-density floppy disk drive (FDD) manufactured by the Shanghai University of Engineering Technology's Donghai Radio Plant on a complete production line imported from the United States has passed environmental, electromagnetic-compatibility, and reliability tests, as well as stability and reliability trials at the Shanghai Computer Plant, the Beijing Haihua New-Technology Development Center, and the Nanjing Zijin Computer Group. Recently, this new FDD passed the design finalization inspection organized by the Shanghai Higher Education Office. The Donghai Radio Plant will soon also begin production and marketing of 5.25-inch 1.2MB and 3.5-inch 1.44MB products.

Sino-Japanese Software Joint Venture 'Synotech' Set Up in Japan

91P60267C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 28, 17 Jul 91 p 41

[Unattributed article: "Sino-Japanese Joint-Venture Software Development Co. 'Synotech' Set Up in Japan"]

[Summary] According to a report in NIKKEI SANGYO SHIMBUN, the Japanese firm CEC and the Chinese Ministry of Metallurgical Industry's Information Center have entered into a joint venture to set up a software development company called "Synotech." The new company, to be founded in Zama, Kanagawa Prefecture, Japan, will combine the strengths of Chinese software technicians with CEC's technology and management expertise. If the new cooperation goes as planned, a development base will be built in Beijing in 1993. The joint venture is capitalized at 50 million yen, 70 percent from the Japanese side and 30 percent from the Chinese side. Synotech will engage in software development projects related to databases, networks, and other areas, and will particularly develop software packages for computers running the UNIX operating system. The new firm is aiming for revenues of 1.2 billion yen by 1995.

MMEI Official Stresses High-Grade Microcomputers in Eighth 5-Year Plan

91FE0619 Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 19, 15 May 91 pp 3, 5

[Article by Liu Chunlu [2692 4783 6922] of the Ministry of Machine- Building and Electronics Industry Computer Department: "High-Grade Microcomputers To Be the Focus of China's Computer Industry Development During Eighth 5-Year Plan"]

[Text]

I. China Should Focus on Developing High-Grade Microcomputers

First, I will discuss why, given the variety of computer products ranging from giant computers to microcomputers, we should focus on developing microcomputers. Next, I will discuss why, among the varieties of microcomputers, we should focus on high-grade microcomputers and workstations.

A. The reasons for focusing on developing microcomputers can be summarized in five points:

1. Demand in domestic markets is greatest for microcomputers.

Projections indicate that by the end of the Eighth 5-Year Plan, yearly demand in China for general-purpose microcomputers and workstations, various types of special-purpose microcomputers (industrial controllers, commercial microcomputers, study computers, word processors and desktop printing systems, communications processors, military microcomputers, and so on) will exceed 700,000 units and will exceed 1 million units for single-chip processors. To focus on developing microcomputers first of all is to satisfy demand in domestic markets. In contrast, if we rely on imports for most of these microcomputers, the outcome is hard to imagine.

2. Only microcomputers offer a basis for achieving a scale economy.

China's computer industry needs to achieve a scale economy but be cannot do it in one swoop. We certainly must select the most basic and most possible part at present to make breakthroughs. Although China's microcomputer output is minuscule compared to total world output, we do actually produce 100,000 units a year. In 1990, there were 10 units in China's computer circles which entered the ranks of the top 100 electronics enterprises. Eight of them were key enterprises that produce microcomputers and one of them produces matching peripherals for microcomputers as well as microcomputers. Another one of them is a software and information service business, but its main target is still microcomputers. The microcomputers produced by the Great Wall, Langchao, and Changjiang enterprise group

account for over 60 percent of total output of microcomputers in China, which shows that microcomputer production in China is moving from a decentralized state to a centralized one.

3. Microcomputers are a tap that can promote the achievement of scale economies in many enterprises which produce peripherals, matching components, integrated circuits, and parts.

Calculating at a production volume of 1 million microcomputer systems, 500,000 mainframe computers, and 2 million function cards per year by the end of the Eighth 5-Year Plan, this would require:

Integrated circuits	200 million
Resistors, capacitors, and other components	several 100 million
Floppy disk drives	1 million
Hard disk drives	500,000
Displays	600,000
Terminals	200,000
Printers	500,000
Computer cases	1 million
Switching power supplies	1 million
Keyboards	600,000
Printed circuit boards	several 100,000 m ²

This shows that microcomputers truly are the key to starting and moving the overall situation. What other type of computer could play this sort of promoting role?

4. Our lag behind advanced world levels is smallest for microcomputers.

It is generally felt that China's microcomputer technology lags 2 years behind advanced world levels. The lag behind advanced world levels for minicomputer and large computer technology is greater or far greater than this figure.

5. Microcomputer products have the greatest hope of entering international markets.

China's exports of microcomputer products have grown very quickly over the past 2 years. In 1990, we exported over 10,000 microcomputer systems, several 100,000 motherboards and other function boards, several 100,000 displays and floppy disk drives, and over 200,000 switching power supplies. We should seize the opportunity and actively develop exports of microcomputer assembly components, matching peripherals, microcomputer mainframe systems, motherboards and other function boards, create an avenue for exporting China's computer products, truly reverse the passive situation of consuming foreign exchange instead of generating foreign exchange in China's computer industry, and achieve a shift from mainly consuming foreign exchange to mainly generating foreign exchange in our computer industry.

B. We should focus on developing high-grade microcomputers.

Here, we should discuss just what high-grade microcomputers are. Using a representative general-purpose microcomputer as an example, the concept of high-grade microcomputers during the Eighth 5-Year Plan is:

1) 32-bit word length, 32-bit bus; 2) Uses coprocessors, high-speed buffer memory, intelligent I/O interface, and other technologies; 3) Main memory basically configured with 16MB, expandable to 128MB or 256MB; basic hard disk configuration several 100MB, expandable to over 1GB; 4) Operational multitasking and multi-user operating system, powerful networking functions, abundance of matching software; 5) Particular strengths in one or more areas (such as powerful graphic processing functions, fast computing speed, etc.).

The most outstanding high-grade microcomputers are called super-grade microcomputers. Overall, high-grade microcomputers that utilize multiple processors and multiple CPU technology and that can operate multi-user operating systems that actually (not logically) have over 32 users are called super-grade microcomputers.

After gaining a clear understanding of what high-grade microcomputers are, it is easy to understand these reasons for focusing on development of high-grade microcomputers:

1. During the Seventh 5-Year Plan, China's microcomputer industry made great advances, but the microcomputers we developed and produced during the Seventh 5-Year Plan were basically middle to low-grade ones and we have just begun working on developing high-grade microcomputers. A focus on developing high-grade microcomputers during the Eighth 5-Year Plan will push China's microcomputer design technology, manufacturing technology, and applications levels up to a new stage.

2. Because the performance/price ratio of high-grade microcomputers and workstations make them powerful competitors, demand within China for this grade of machine continues to expand. Replacing imports of high-grade microcomputers and workstations will save the state \$100 to \$200 million in foreign exchange each year.

3. Using high-grade microcomputers as network servers can conserve a number of units for networking with low-grade microcomputers and could help expand the market for middle and low-grade microcomputers, which China is already capable of producing in large numbers.

4. High-grade microcomputer board-level products can be used to upgrade middle and low-grade microcomputers and thereby enable users in China who have already purchased several 100,000 microcomputers to

restore new life to them at rather low cost. This alone could provide several 100 million yuan in economic benefits. Moreover, there are excellent export prospects for high-grade microcomputer board-level products that could earn a considerable amount of foreign exchange for the state.

5. Development and production of high-grade microcomputers could create newer and higher demand for system software, support software, implementation software, applied software, and other categories of software both in breadth and depth. This sort of demand for software products involving considerable technical difficulty and great amounts and breadth will provide an excellent opportunity for opening up software markets and improving software and information service levels, which would aid in the formation and development of software markets.

In passing, I would like to say that internationally, there are no super-grade microcomputers at present which have had their names changed to mid-size or minicomputers because the functions of certain mid-size computers in the traditional sense are more powerful. Regarding this point, as far as Chinese people are concerned, this is not something that is inconceivable. The reason is simply that, while it is a fact that the Empress Dowager Ci Xi never enjoyed watching television programs, it is not necessary because of this for today's common people to be placed into the landlord class.

II. Make Breakthroughs in Key High-Grade Microcomputer Technology

The development of high-grade microcomputers must be led by science and technology and must be based on self-development. On the basis of achievements made during the Seventh 5-Year Plan, we must concentrate forces during the Eighth 5-Year Plan and focus on breakthroughs in key technologies.

A. General-purpose high-grade microcomputers and workstations

The primary key technologies in this area are:

1) High-speed 32-bit bus (or channel) technology, multi-level bus technology; 2) High-speed buffer memory technology, multilevel memory technology; 3) Multiple processor and multiple CPU technology; 4) Parallel processing technology; 5) Intelligent I/O interface control technology; 6) Multimedia technology; 7) High-level Chinese information and graphics processing technology; 8) ASIC design technology; 9) RISC design and system integration technology.

B. Special-purpose high-grade microcomputers

There are many varieties of high-grade microcomputers and I will not cover them all here. I will limit my discussion to industrial control computers, commercial microcomputers, and military microcomputers.

1. Key technologies for industrial control computers:

- 1) Interconnection technology, control technology, and communications technology for DCS industrial control system multilevel distribution structures.
- 2) Industrial control computer technology that is tolerant of horrible environments (such as shock, high humidity, high temperatures, low pressures, dense dust and hazardous gases, etc.) and interference-resistant (such as common mode, series mode, electrostatic, surges, transient overvoltage, powerful magnetism, etc.) technology.
- 3) Highly reliable, self-recovering, and fault-tolerant technology for industrial control computers.
- 4) Signal isolation and conditioning technology for all types of physical values in industrial control computer I/O systems.
- 5) Real-time multitasking operating systems, support software, implementation software, and integrated software packages with configuration functions, generation functions, diagnostic functions, and self-recovery functions in industrial control computer systems.

2. Key technologies for commercial microcomputers:

- 1) System structure technology in commercial computer systems with multilevel structures; 2) Integrated multi-function reconfigurable technology for code reading, magnetic card banking, tax statistics, display and printing, and store management; 3) High reliability, interference-resistant technology for commercial systems; 4) Integrated software packages for banking systems and comprehensive information management systems.

3. Key technologies for military microcomputers:

- 1) High reliability technology (such as fault-tolerant technology, breakdown diagnosis and recovery technology, etc.); 2) Interference-resistant technology (such as resistance to interference from outside electrical signals, magnetic signals, optical signals, etc.); 3) Information security and secrecy technology (such as technology to eliminate electromagnetic signal radiation transmitted by the systems themselves, digital encryption and decryption technology, etc.); 4) Reinforcement technology, volume reduction technology, and non-interruptible power supply technology suitable for use on vehicles, ships, and aircraft; 5) Systematized software for military purposes.

C. Basic software for high-grade microcomputers and workstations

1. Basic software for operating systems and workstations

The war drums are already sounding for the autonomously copyrighted general-purpose UNIX operating system and attacks are being made on hardware instruction systems for general-purpose UNIX and for high-grade microcomputers and workstations (CISC, RISC).

The core design and enabling technology associated with the system structure are one of the most important campaigns to leap over the high-grade microcomputer, workstation, and software realms.

DOS still continues to occupy a rather large portion of the market. China's S&T personnel have done a great deal of highly effective work in the areas of converting DOS to the Chinese language and developing our own PC computer operating systems. Autonomously copyrighted PC computer operating systems should be an urgent task during the Eighth 5-Year Plan.

2. Database software

The main task is to develop database management systems based on three internationally popular types (multiuser and multitasking, single user and multitasking, and single user and single tasking) of operating system platforms that conform to international SQL language standards.

3. Application software oriented toward system hardware configuration optimization and functional expansion.

4. Integrated support software for object-oriented processing.

5. Various types of implementation software, such as:

CAD/CAM/CAI and other implementation software;

Implementation software for conversion and transposition of different types of databases;

Implementation software for MIS system generation and augmentation.

6. Various types of performance evaluation software, such as:

Basic performance evaluation software;

Applied performance evaluation software;

System performance evaluation software;

Special performance evaluation software;

Software and hardware compatibility and expansion evaluation software.

D. Microcomputer networks

Technical levels of China's microcomputer networks and the proportion of the domestic market for which they account are much more backward than mainframe systems. The distance between our network technology and international levels is also much greater than the distance between mainframe system technology and international levels. If we do not give them sufficient attention and take urgent measures, China's dependence on foreign products will become increasingly serious, not only for wide-area networks but for local-area networks as well.

The network technologies where we should make key breakthroughs during the Eighth 5-Year Plan are:

1) High-speed fiber optic ring networks with transmission speeds of 100MBps (mainly used for trunkline networks as well as for high-speed front-end networks and rear-end networks); 2) Highly-integrated Ethernet server and interface technology oriented toward all types of high-grade microcomputers based on ISA/EISA/MCA; 3) Network switching and adaptor technology oriented toward multiple types of network environments; 4) Network protocols and their transfer technology which conform to international standards.

E. Peripherals for high-grade microcomputers and workstations

1) High-density moderate (and large) capacity (e.g., 110MB to 650MB) hard disk controllers; 2) 3.5 inch and 2 inch large capacity floppy disk drives; 3) 24-pin high-speed printers; 4) Multi-frequency color displays and high resolution color displays.

F. Production technology

1) Construction of quality-assurance systems and standards certification systems for use in batch production; 2) Technologies for resistance to electromagnetic interference and for elimination of electromagnetic radiation; 3) Techniques and technologies for reduced-sized structures for computers; 4) On-line breakdown diagnosis, testing, and recovery technology; 5) Surface adhesion technology; 6) High-strength surface spray coating technology.

Please note that production technology is an important link in the scale economy described above, but in the past we have done the least work and have the least experience in this area, which should receive sufficient attention.

G. Typical applications systems

Systems development of high-grade microcomputer and workstations must proceed concurrently with typical applications systems development to enable close coordination between computer production departments and applications departments and thereby aid in opening up markets and broad applications for high-grade microcomputers and workstations.

III. Conclusion

1. The microcomputer industry is the core of China's computer industry. Developing high-grade microcomputers is the key to development of the microcomputer industry. This requires not only self-strengthening and

dedication by colleagues in computer industry circles but also requires the care and support of all users and even more requires the attention and support of the state.

2. The development of high-grade microcomputers can no longer adopt the model of "original assembled computer imports—SKD imports—CKD imports—key component imports" but instead should be based on self-development from the very beginning. If we continue to employ the previous model, the result will be 2 years for SKD, 2 years for CKD, and another 2 years for key components, and foreign countries will already have updated products so we will have to start the cycle from SKD again. When, then, will we have our own high-grade microcomputer products and when will we have our own comparable microcomputer industry?

3. Our goal is not just to develop high-grade microcomputer and workstation technology and products. We must be highly concerned with construction and perfection of development systems and development environments during this process, strengthen development measures, improve our own development capabilities, and shorten new product development schedules. At the same time, we must establish product quality and standards certification systems.

4. While adhering to self-development, actively develop international cooperation, select sincere cooperative partners, truly implement the principle of integrating technology with trade and mutual benefit, and promote the development of China's microcomputer industry.

5. Continue to focus on production and improvement of middle and low-grade microcomputers, improve quality, develop applications, open up markets, and guarantee services.

6. Large computers and giant computers undoubtedly are important for our country. However, China could have new ideas concerning the development of large and giant computers. It should be noted that there is a qualitative leap in technical difficulty and performance of high-grade microcomputers compared to middle and low-grade microcomputers. It can be said that the high-grade microcomputers of today are just smaller versions of the large and mid-sized computers of the past. Certain computer products recommended internationally (such as the NCR 3000 series and others) show that future computer system structures will have obvious recombination and reconfiguration characteristics. High-grade microcomputers are the mainframes of motherboard arrays and there will be no insurmountable chasms between future mid-sized and large computers and high-grade microcomputers. Of course, developing large computers and giant computers also involves many other issues that cannot be discussed in this article.

First Domestically Developed Manned Underwater Robot Unveiled

91P60231 Beijing RENMIN RIBAO [PEOPLE'S DAILY] Overseas Edition in Chinese 11 Jul 91 p 4

[Article by Shi Changxue [2457 2490 1331] and Deng Ning [6772 1337]: "First Manned Underwater Robot Developed"]

[Summary] Yulin, 9 Jul—The nation's first manned underwater robot—the "model QSZ-II single-man, normal-pressure diving apparatus system," developed in a three-year effort by a 40-odd-man team led by Associate Chief Engineer Xu Qinan [1776 5344 0589] of Institute

702 in the China State Shipbuilding Corporation—has passed its sea trials, including almost 40 days of unmanned and manned dives. Developed on commission to the Navy, this 2.1-meter-high 650-kilogram underwater robot can dive to and function at a depth of 300 meters; is equipped with four rear-mounted vertical and horizontal propellers, permitting all types of motion including diving, surfacing, and forward and backward movements; has two arms and two legs, permitting various articulated activities; and comes with front-mounted depth and bearing instruments, video recording devices, and illumination equipment. The sea trials show that the new underwater robot's performance meets international standards of the late eighties.

Additional Details on Domestically Developed 10KW CO₂ Laser Revealed

91P60259A Shanghai ZHONGGUO JIGUANG
[CHINESE JOURNAL OF LASERS] in Chinese Vol 18
No 6, Jun 91 p 457

[Article by Ji Zhong [4764 6988]: "China Develops New 10,000-Watt CO₂ Laser"; cf. earlier report in JPRS-CST-91-010, 17 May 91 p 35]

[Summary] The CAS Shanghai Institute of Optics and Fine Mechanics [SIOFM] has developed a new 10KW transverse-flow CO₂ laser with dimensions of 2m x 2m x 2.5m. The expert appraisal group has certified that this state-of-the-art CO₂ laser has the following specifications: multimode running-time output power is over 10KW, with an electro-optical conversion efficiency of 14 percent; low-order-mode running-time output power is 6KW, with an electro-optical conversion efficiency of 8.3 percent; beam divergence angle (full angle) is 2.2 milliradians; and single-gas-filling CW operation is 8 hours at a 10KW-plus power level.

Optical Multi-Bit Matrix Multiplier Realized

91P60259B Shanghai ZHONGGUO JIGUANG
[CHINESE JOURNAL OF LASERS] in Chinese Vol 18
No 6, Jun 91 pp 462-465

[Article by Zhou Shaomin [0719 1421 2404], Wu Minxian [6762 2404 6343], and Jin Guofan [6855 0948 5672] of the Department of Precision Instruments, Qinghua University, Beijing, 100084: "Optical Multi-Bit Matrix Multiplier"; MS received 6 Dec 89]

[Abstract] A high-accuracy, high-speed method of optical matrix multiplication using modified signed digit (MSD) arithmetic and a two-channel multi-window-decoding optical symbolic substitution rule (MW-OSSR) physical arrangement—including decoding masks, NOR gates, a 632.8-nm-wavelength He-Ne "read" laser, a 488.0-nm-wavelength Ar-ion "write" laser, a PROM, beam splitters, lenses, and other optical elements—is proposed

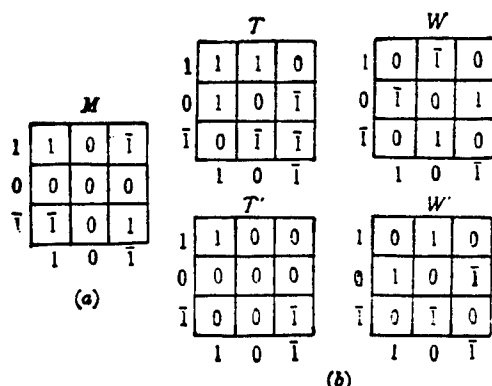


Figure 1. Mathematical Operation Rule of MSD

and realized. In experiments, the authors used this arrangement to multiply two 2x2 32-bit MSD matrixes in one second.

Figures 1-5, shown below, depict the basic principle. Figure 6 [photo not reproduced] depicts experimental results of partial product computation.

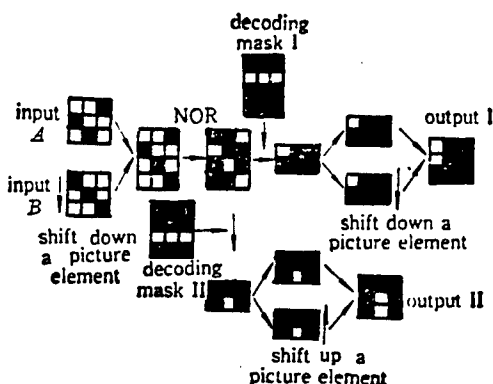


Figure 2. Principle of Two-Channel MW-OSSR

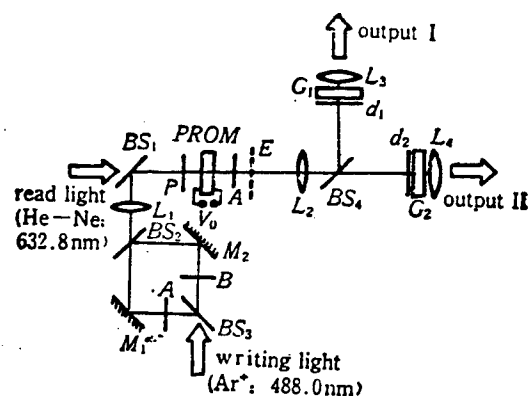


Figure 3. Optical System of Two-Channel MW-OSSR

BS₁-BS₄—beam splitter; L₁-L₄—lenses; M₁-M₂—mirrors; A, B—input patterns; G₁, G₂—diffraction gratings; d₁, d₂—decoding masks; E—equivalent decoding; P—polarizer; A—analyzer

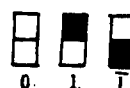


Figure 4. Dual Rail Coding of Operator

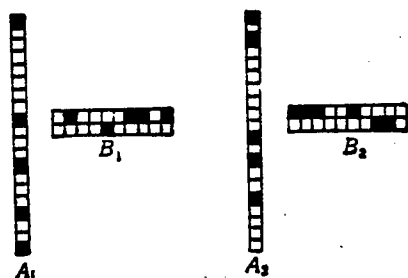


Figure 5. Dual Rail Coding Results of A1, B1, A2 and B2

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Broadband Frequency-Doubled Nd-Glass Laser Built at SIOFM

91P60269A Beijing ZHONGGUO KEXUE BAO [CHINESE SCIENCE NEWS] in Chinese 5 Jul 91 p 2

[Article by Shang Guang [1424 0342]: "Broadband Frequency-Doubled Neodymium-Glass Laser Apparatus Completed"]

[Summary] Shanghai (ZHONGGUO KEXUE BAO wire report)—The broadband frequency-doubled Nd-glass laser apparatus developed in a 10-year effort by researchers from the CAS Shanghai Institute of Optics and Fine Mechanics (SIOFM) passed CAS-level technical appraisal on 10 June. This high-power apparatus, used in laser fusion research to implement high-density target compression via laser direct drive, has been developed only by a small number of other nations, including the United States and Japan.

The development of this new laser apparatus indicates that SIOFM has overcome problems such as broadband three-wave nonlinear wave coupling in a Q-switched laser, suppression of nonlinear effects, and the requirement for directionality of the frequency-doubled laser beam to be superior to the directionality of the fundamental-frequency beam. The completion of this apparatus represents a major improvement to SIOFM's LF12 laser fusion facility, and will provide a valuable research tool in developing even larger-scale laser fusion equipment.

Automatic EMI Testing System Constructed

91P60269B Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 7 Jul 91 p 3

[Article by Xu Jiazhen [1776 1367 2398]: "Electromagnetic-Interference Automatic Testing System Completed"]

[Summary] The electromagnetic-interference (EMI) automatic testing system built by Ministry of Aerospace Industry (MAS) Institute 203 recently passed appraisal. The new system, used for fault diagnosis, environmental testing, and GJB-151/152 standard testing, has a measurement frequency range of 14 kHz to 18 GHz. Amplitude measurement accuracy is better than ± 2.85 dB for frequencies up to 30 MHz, better than ± 3.86 dB in the 30 MHz-6 GHz range, better than ± 4.81 dB in the 6-16 GHz range, and better than ± 5.06 dB in the 16-18 GHz range.

Large-Vertical-Aperture Antenna Developed for Navigational Radar

91P60269C Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 7 Jul 91 p 3

[Article by Liu Jun [0491 6511]: "Navigational-Radar Large-Vertical-Aperture Antenna Joint Trials Successful"]

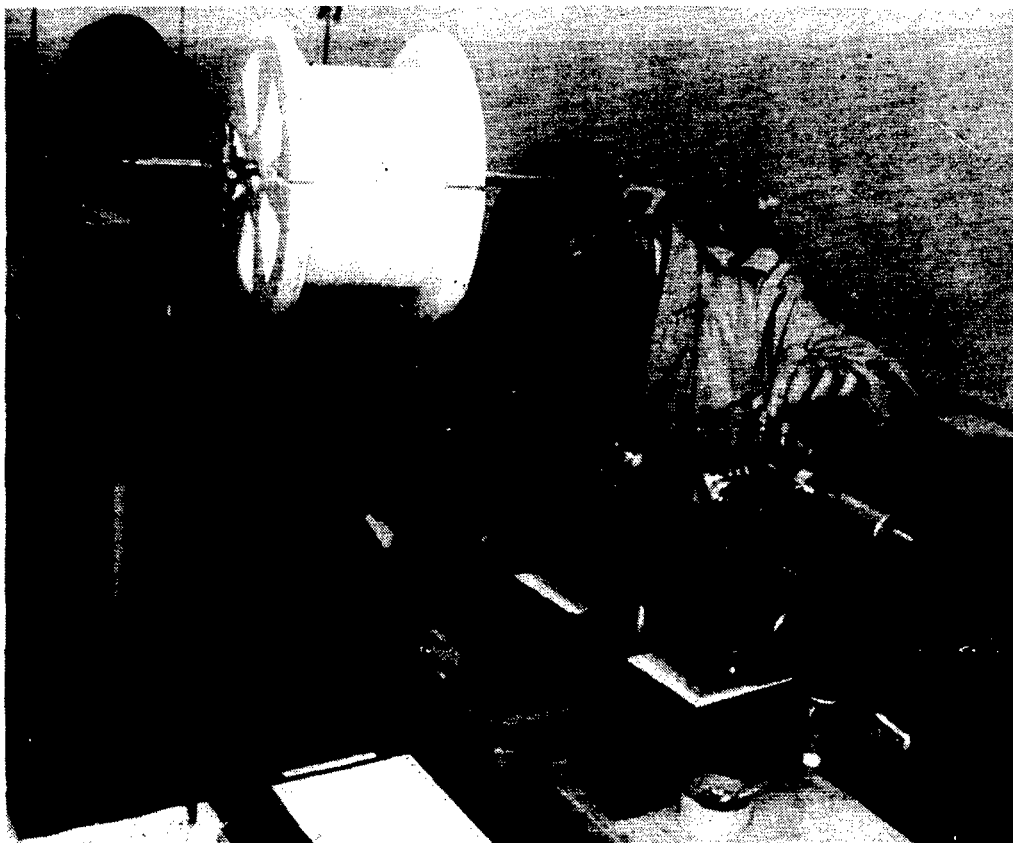
[Summary] The secondary-radar-oriented navigational-unit LVA-500 large-vertical-aperture antenna independently designed and developed by the state-run Fujiang Machine Plant recently passed joint tests in the No. 2 navigational system made by Chengdu Plant 784. This monopulse antenna, the first of its kind to be put into production domestically, has high antenna gain and cosecant-squared vertical lobes; over long periods of continual tracking, it will not lose its target point within a range of 250 km. In the strap-down trials, it successfully maintained a lock on the target for continuous tracking at ranges of up to 360 km.

High-Birefringence Single-Mode Optical Fiber Developed

91P60269D Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 9 Jul 91 p 1

[Untitled photoreport accompanying photo by Wang Zijin]

[Text] Using domestically made equipment, scientists at Shanghai University of Science and Technology's Fiber Optic Technology and Modern Communications Institute have innovatively developed a new type of optical



fiber with many applications—high-birefringence single-mode optical fiber. This mid-to-late-eighties-level special type of optical fiber is primarily used in fiber optic sensors, especially in a key sensor device, the fiber optic gyro.

The accompanying photo shows Professor Huang Zhaoming [7806 5128 2494] (right) conducting performance testing.

Radar Receivers Incorporate Microelectronics Techniques

91P60269E Beijing ZHONGGUO DIANZI BAO
[CHINA ELECTRONICS NEWS] in Chinese 14 Jul 91
p 3

[Article by Jiang Deqing [1203 1795 3237]: "First Results Seen in Application of Microelectronics to Radar Receivers"]

[Summary] The application of microelectronics techniques to radar receivers—a priority Seventh 5-Year Plan project—is now bearing fruit. An MMEI Institute 38 research project entitled "Design of Microelectronics-Based [i.e., all-solid-state] Radar Receivers" has passed appraisal. This project aims to standardize, modularize,

and serialize radar receivers; to reduce size and weight; and to improve performance-to-cost ratio, reliability, and serviceability.

In terms of modularization, radar receivers will have four basic modules (not including the local oscillator source): the HF unit, the mixer unit, the normal IF unit, and the coherent IF unit; these are to be supplemented by one or two expandable modules. Modularized receivers are to have a single-channel MTBF of at least 10,000 hours and a single-unit MTTR [mean time to replacement] of less than two minutes. To cover the entire frequency range, a series of six modules—meter-wave, P-band, L-band, S-band, C-band, and X-band—are being made. The different requirements of all three military services must be met.

Soft-X-Ray Picosecond Framing Camera Developed

91P60269F Beijing ZHONGGUO KEXUE BAO
[CHINESE SCIENCE NEWS] in Chinese 19 Jul 91 p 1

[Article by Wang Baizhan [3769 4102 2069]: "Soft-X-Ray Picosecond Framing Camera Unveiled"]

[Summary] Xian (ZHONGGUO KEXUE BAO wire report)—A soft-X-ray picosecond (ps) framing camera recently developed by the [CAS] Xian Institute of Optics

and Fine Mechanics (XIOFM) has passed CAS-level appraisal. The experts have certified that this state-of-the-art apparatus will provide a powerful diagnostic tool for domestic research in inertial confinement fusion and X-ray lasers. Only France, the United States, Great Britain, Japan, the Soviet Union, and now China have developed this advanced equipment. The XIOFM-developed apparatus has a 250-ps exposure time and a dynamic spatial resolution of five lines per millimeter.

Fully Automatic OCR Developed, Batch Produced

91P60230 Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 30 Jun 91 p 1

[Article by Peng Nieping [1756 5119 5493] and Wang Mengling [3769 1322 7117]: "All-Automatic Optical Character Reader Unveiled"]

[Summary] The first domestic all-automatic optical character reader (OCR), jointly developed and manufactured by the University of Science & Technology for National Defense and the Hunan Province Education Commission's Student Recruiting Office has proven remarkably efficient in trial statistical work for the Hunan Province higher examination system. The writers observed a demonstration in which 100 standard examination papers were inserted into the upper right end of a machine the size of a 47-cm TV set; three seconds later the sheets one after another began rapidly popping out at the lower right end. Meanwhile, the test names and test scores began appearing on the microcomputer monitor screen. In 50 seconds, the entire process was completed, and tests showed that accuracy had reached 100 percent.

After this, the engineer inserted several examination papers with blank test names or with improperly coded names into a pile of [accurately filled out] examination papers; all of the papers not meeting specifications were detected and displayed on the screen, and accuracy again was 100 percent. The engineer explained that four such all-automatic OCRs can replace almost 1000 workers grading papers by hand.

Low-Threshold Three-Segment Composite-Cavity-Structure GaAlAs/GaAs Single-Mode Laser

40100075a Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 18 No 6, Jun 91 pp 401-404

[English abstract of article by Li Yudong, Zhu Donghai, Liu Shiyong, Shu Shichang, Zhang Shuzhi, Department of Electronics Sciences, Jilin University, Changchun. MS received 18 Sep 89]

[Text] A low-threshold three-segment composite-cavity GaAlAs/GaAs laser is reported with a lowest CW threshold current of about 18 mA. It operates in stable single mode; external differential quantum efficiency is 50-80% and the best linear relationship between light output and current remains up to 30 mW. Single-frequency oscillation locking is achieved over a temperature range of around 5°C and the highest temperature for CW lasing is 117°C.

Luminescence Properties of ZnWO₄:Cr³⁺ Laser Crystals

40100075b Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 18 No 6, Jun 91 pp 446-449

[English abstract of article by Zang Jingcun, Wu Shao-hua, Ma Yue, Department of Chemical and Environmental Engineering, Beijing Polytechnic University, Beijing. MS received 21 Nov 89, project supported by NSFC]

[Text] Luminescence properties of ZnWO₄:Cr³⁺ laser crystals were investigated. The ⁴T₂ energy level of Cr³⁺ split into three levels, 13550, 14205, and 14706 cm⁻¹, and the Stokes shift of luminescence spectra is 236 nm. The best intensity peak of emission is at 912 nm. If the excitation wavelength was selected as 608 nm and doping concentration was 0.01 wt%, a broad emission band would be observed at 532 nm excitation.

Retrospective Correlation Method for Improving Detection of Weak Signals in Clutter Interference Environment

40100069A Wuhan HUAZHONG LIGONG DAXUE XUEBAO [JOURNAL OF HUAZHONG (CENTRAL CHINA) UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese Vol 19 Supl 1, Apr 91 pp 101-107

[English abstract of article by Zeng Guifang, Liu Huazhi, and Cao Weixuan; MS received 3 May 90]

[Text] A new method for improving the performance of an early warning radar is presented. The concept of the retrospective correlation method is explained. The improvement of the detection performance of weak signals from the two-dimensional information of the present scan and several previous ones by the retrospective correlation method and its implementation are described. The basis for parameter selection of retrospective correlation processor is given.

Detection Performance of Radar Signals by Retrospective Correlation Processing

40100069B Wuhan HUAZHONG LIGONG DAXUE XUEBAO [JOURNAL OF HUAZHONG (CENTRAL CHINA) UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese Vol 19 Supl 1, Apr 91 pp 109-116

[English abstract of article by Liu Huazhi, Zeng Guifang, and Cao Weixuan; MS received 3 May 90]

[Text] Theoretical analysis and computer simulation for the detection performance of radar signals by retrospective processing have been carried out. The formulae for calculating the false alarm probability in the presence or absence of a target as well as for the target detection probability of the complete processing system have been derived. The effect of radar measurement error and the target measurability on detection performance is discussed.

**Research on a New Algorithm for Identification of
Noise FM Jamming Bandwidth by Radar Video
Waveform**

40100077A Beijing *DIANZI XUEBAO [ACTA
ELECTRONICA SINICA]* in Chinese Vol 19 No 4,
Jul 91 pp 116-119

[English abstract of article by Jia Xin of Hefei Institute
of Electronic Engineering, Liang Taiji, and Guo Guirong

of the National University of Defense Technology; MS
received Oct 89, revised Apr 90]

[Text] A new algorithm for identification of noise FM
jamming bandwidth based on radar video waveform is
proposed and has been implemented experimentally.
Results indicate that the identification system has higher
identification rate.

New-Generation Gallium Arsenide ICs Developed

91P60268A Beijing ZHONGGUO KEXUE BAO
[CHINESE SCIENCE NEWS] in Chinese 2 Jul 91 p 2

[Article by Liu Chang'an [0491 7022 1344]: "New Generation of Gallium Arsenide Integrated Circuits Unveiled"; cf. earlier report in JPRS-CST-91-006, 5 Mar 91 p 26]

[Summary] Shijiazhuang (ZHONGGUO KEXUE BAO wire report)—A new generation of gallium arsenide (GaAs) ICs called very-high-speed ICs (VHSICs) and a CAD special-purpose software package [for GaAs IC design] developed by MMEI's Research Institute 13 recently passed national-level appraisal in Shijiazhuang. Fabricated domestically despite restrictions placed by developed nations on export of these chips to China, these VHSICs are used in a variety of high-tech fields, including computers, communications, radar, electronic countermeasures, and high-speed testing.

During the Seventh 5-Year Plan, Institute 13 successively developed a 3 GHz GaAs static frequency divider, a 5 GHz [GaAs] dynamic frequency divider, a 208-gate GaAs gate-array VHSIC, 2-inch [wafer] fabrication technology for GaAs ICs, an InGaAs heterojunction HEMT and associated circuitry, a heterojunction bipolar transistor with a maximum oscillation frequency of over 14 GHz and associated circuitry, and a special CAD software package for design of GaAs microwave devices and VHSICs.

These developments have tracked or closely approached the international state-of-the-art—i.e., the devices meet mid-to-late eighties international standards—and will provide a strong impetus to further progress in the domestic microelectronics industry in the Eighth 5-Year Plan.

Atomic-Level Epitaxy System Developed

91P60268B Beijing ZHONGGUO DIANZI BAO
[CHINA ELECTRONICS NEWS] in Chinese 5 Jul 91 p 1

[Article by Wang Yueqing [3769 2588 3237]: "New Atomic-Level Epitaxy System Developed"]

[Summary] The technology and equipment for a "rapid radiation heating, very-low-pressure chemical vapor deposition" (RRH/VLP-CVD) system, developed as a State High-Tech "863" Plan optoelectronics project, passed the State S&T Commission-organized appraisal in Beijing on 25 June. This new atomic-level epitaxy equipment, widely used in developed nations for growing semiconductor ultrathin (i.e., atomic-level) films, heterojunction materials, quantum-well materials, and superlattices, was developed by scientists at Nanjing University's Semiconductor and Superlattice Laboratory (NUSSL). The expert appraisal committee judged it to be at the international state-of-the-art. The NUSSL

researchers are now studying Ge-Si superlattices grown via the new equipment, as well as fabrication of new Ge-Si devices.

National Conference on Flat Screen Displays Convened

91P60268C Beijing ZHONGGUO DIANZI BAO
[CHINA ELECTRONICS NEWS] in Chinese 14 Jul 91 p 3

[Article by Sun Guohua [1327 0948 5478] and Cui Guangjun [1508 1639 0193]: "National Flat-Screen-Display Conference Convened"]

[Summary] A national academic-exchange conference on flat screen displays (FSDs) and associated applied technology convened the other day at the facilities of Beijing Institute 55. Over 100 specialists from domestic universities, research institutes, and industrial plants participated in this conference to study FSDs, which cover a range of new devices especially needed in the fields of aerospace and navigation. Conference organizers received over 100 scientific papers on plasma displays, LCDs, electroluminescent displays, and other types. At the conference, a "China Electronics Society Optoelectronics-Devices Special Committee" was formed.

Scattering Spectroscopic Studies on Optical Phonons of ZnSe Film Grown on (100) GaAs by Hot Wall Epitaxy

40100067A Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese
Vol 12 No 7, Jul 91 pp 387-391

[English abstract of article by Lao Pudong and Wang Jie of the Department of Physics, Fudan University, Shanghai, 200433 and Yao Wenhua and Zheng Siding of the Center of Analysis and Measurement, Fudan University, Shanghai, 200433; MS received 5 Sep 90]

[Text] A room-temperature Raman scattering study of ZnSe film grown by hot wall epitaxy (HWE) on (100) GaAs is reported. The linewidth measurements of the ZnSe longitudinal (LO) phonon Raman peak indicate that ZnSe single-crystal film of good quality has been grown on (100) GaAs substrate using HWE growth technique. The appearance of ZnSe transverse optical (TO) phonon Raman peak from sample with poor quality in back-scattering configuration is attributed to internal microscopic misorientation related to twinning during the epitaxial growth of the film. It is noticed for the first time that the Raman intensity of LO phonon-plasmon coupled mode of n-type GaAs used is twice enhanced by chemical etching to the GaAs surface. It is proved that this enhancement is due to the decrease of the thickness of the oxide layer on GaAs surface by chemical etching, increasing the penetration depth of incident laser beam in GaAs under the oxide layer.

Room-Temperature Photocurrent Spectroscopy of GaAs/GaAlAs Multiple Quantum Wells

40100067B Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese
Vol 12 No 7, Jul 91 pp 399-404

[English abstract of article by Duan Hailong, Wang Qiming, Wu Ronghan, Zeng Yiping, and Kong Meiyang of the Institute of Semiconductors, CAS, Beijing, 100083; MS received 6 Jul 90, revised 14 Jan 91]

[Text] By means of room-temperature photocurrent spectroscopy, we have studied the effect of electric field on the exciton absorption in GaAs/GaAlAs multiple quantum wells and have discussed the effect of electric field on the photocurrent spectra for some kinds of MQW structures. The requirements of the related optoelectronic devices for MQW materials are also discussed.

Microstructural Characterization of GaAs/AlGaAs Superlattices Grown on Patterned Si Substrates

40100067C Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese
Vol 12 No 7, Jul 91 pp 412-415

[English abstract of article by Fan Tiwen and Liang Jiben of the Semiconductor Materials Science Laboratory, CAS, Beijing, 100083; MS received 19 Sep 90, revised 20 Dec 90]

[Text] Microstructures and growth behavior of GaAs/AlGaAs superlattices grown by molecular beam epitaxy on Si(001) patterned substrates are examined by cross-sectional transmission electron microscopy studies. It is found that the geometrical profile of etched channels has an influence on characteristics of microdefects and growth behavior of epitaxy layers. Compared with Si[001] crystal planes, Si[113] may be promising for semiconductor heterojunction epitaxy.

GaAs/GaAlAs RIE-Facet Laser

40100076A Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese
Vol 12 No 8, Aug 91 pp 477-481

[English abstract of article by Zhuang Wanru, Yang Peisheng, Chen Jiying, and Li Jianzhong of the Institute of Semiconductors, National Integrated Optoelectronics Lab., P.O. Box 912, Beijing 100083; MS received 5 Oct 90, revised 22 Jan 91]

[Text] One facet of a GaAs/GaAlAs DH [double heterojunction] laser cavity was formed by using reactive ion etching (RIE) technique. CW lasing was observed in the lasers fabricated by this method. Compared with the cleaved cavity lasers, the average threshold current of RIE-facet lasers has increased by about 18 percent, and the average external differential quantum efficiency decreased by about 14 percent.

Preparation and Analysis of GdBa₂Cu₃O_{7-x} Superconducting Thin Films

40100076B Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese
Vol 12 No 8, Aug 91 pp 502-508

[English abstract of article by Yi Huai ren, Wang Ruilan, et al. of the Institute of Physics, CAS, Beijing, 100080; MS received 10 Oct 90, project supported by NSFC]

[Text] High-quality epitaxial superconducting thin films of GdBa₂Cu₃O_{7-x} have been prepared in situ on (100)SrTiO₃, (110)SrTiO₃, (100)LaAlO₃, (100)Zr(Y)O₂ substrates by dc-magnetron sputtering. The reproducibility is very good. The best films grown on the four substrates have zero-resistance critical temperature T_{co} of 93.2, 93.1, 92.6, 92.5K and critical current density of 3×10^6 , 3×10^5 , 3.6×10^6 , 1.4×10^6 A/cm² at 77K, respectively. The film structures were studied by scanning electron microscopy (SEM), transmission electron microscopy (TEM), reflection high-energy electron diffraction (RHEED) and X-ray diffraction spectra in different geometries. The results show that the superconducting thin films are grown epitaxially on the substrates.

Rb-Doped C₆₀ Synthesized by Beijing University Researchers

91P6 Beijing RENMIN RIBAO in Chinese 2 Aug 91 p 3

[Article by Zhao Xuwen [6392 1331 2429]: "Beijing University Synthesizes Rubidium-Doped C₆₀ Superconducting Material"]

[Summary] After their successful synthesis of K-doped C₆₀ on 9 July [see FBIS-CHI-91-143, 25 Jul 91 pp 35-36 and JPRS-CST-91-017, 5 Aug 91 p 25], researchers from Beijing University's Chemistry and Physics Departments succeeded in synthesizing Rb-doped C₆₀ on 23 July—only a half month's time. The AC magnetic susceptibility test conducted by scientists at the CAS Institute of Physics' State Superconductivity Key Laboratory indicates that the newly synthesized Rb-doped C₆₀ material has a superconducting onset temperature of 28K. The microwave absorption test simultaneously conducted by researchers at the Beijing University Physics Department's Electron Paramagnetic Resonance Laboratory indicates a transition temperature of 29K, only one degree below the value of 30K achieved in other laboratories worldwide.

High-J_c Ag-Bi-Pb-Sr-Ca-Cu-O Superconductors Synthesized

91P60255 Beijing KEXUE TONGBAO in Chinese
Vol 36 No 14, 16-31 Jul 91 p 1119

[Article by Ren Yufang [0117 3768 5364], Zeng Zuotao [2582 1563 7290], et al. of the CAS Changchun Institute of Applied Chemistry, Changchun, 130022: "High-J_c Ag-Bi-Pb-Sr-Ca-Cu-O Superconducting Material"]

[Summary] Bi₂Sr₂Ca₂Cu₃O_y-Ag_x, Bi_{1.7}Pb_{0.3}Sr₂Ca₂Cu₃O_y-Ag_x, and Bi_{1.7}Pb_{0.3}Sr₂Ca₂Cu_{3.2}O_y-Ag_x superconductors have been synthesized from AgNO₃, PbO, Bi₂O₃, CaCO₃, SrCO₃, and CuO raw materials baked at 800°C for 12 hours, polished, and sintered at 850°C for 200 hours, with some additional steps. T_c [critical temperature] was 110K. When measured at 77.3K, critical current density (J_c) was 1010 A/cm² for the Bi_{1.7}Pb_{0.3}Sr₂Ca₂Cu_{3.2}O_y-Ag_{0.5} samples and density was 5.6 gm/cm³. When x is raised above 0.5, J_c falls.

High-T_c Superconducting Thin-Film Microwave Filter

40100078A Beijing DIANZI KEXUE XUEKAN
[JOURNAL OF ELECTRONICS] in Chinese Vol 13
No 4, Jul 91 pp 413-416

[English abstract of article by Cao Xiaoneng, Yang Caibing, Fang Xizeng, Li Shuqin, and Shi Yanyang of the Institute of Electronics, CAS, Beijing; Yi Huairen, Wang Ruilan, and Li Hongcheng of the Institute of Physics, CAS, Beijing; MS received 30 Jan 91, revised 15 Mar 91]

[Text] A suspension superconducting thin-film microwave low-pass filter was developed by using GBCO

[gadolinium-barium-copper oxide] film on yttria-stabilized zirconia (YSZ) substrate. The insertion losses measured at 77K are 0.326 dB, 0.507 dB, 1.393 dB in the frequency bands of 0-2 GHz, 0-4 GHz, 0-6 GHz, respectively. Experimental results show that the suspension microstrip circuits are suitable for developing microwave passive components made from high-T_c superconducting films with high-dielectric-constant substrates.

Investigation of Multilayer YBa₂Cu₃O_x-PrBa₂Cu₃O_x-YBa₂Cu₃O_x Films

40100066A Beijing DIWEN WULI XUEBAO
[CHINESE JOURNAL OF LOW TEMPERATURE
PHYSICS] in Chinese Vol 13 No 4, Jul 91 pp 264-267

[English abstract of article by Hu Yifei, Wang Shiguang, Liu Rangjiao, and Dai Yuandong of the Department of Physics, Beijing University, Beijing, 100871; MS received 28 Nov 90]

[Text] We have fabricated trilayer YBa₂Cu₃O_{x2}Cu₃O_x-YBa₂Cu₃O_x epitaxial films by magnetron sputtering. The lower and upper YBa₂Cu₃O_x films had transition temperatures (zero resistance) of 82K and 80K respectively. The resistivity of PrBa₂Cu₃O_x was about 8 x 10⁴Ω-cm at 77K.

Ar-Ion Beam Thinning Used for TlBaCaCuO-Film Microbridges

40100066B Beijing DIWEN WULI XUEBAO
[CHINESE JOURNAL OF LOW TEMPERATURE
PHYSICS] in Chinese Vol 13 No 4, Jul 91 pp 268-270

[English abstract of article by Liu Rangjiao, Zeng Xianhui, Wang Shiguang, and Dai Yuandong of the Department of Physics, Beijing University, 100871; MS received 6 Nov 90]

[Text] Variable-thickness bridges of TlBaCaCuO thin film are fabricated by chemical wet etching and ion-beam-thinning technique. The critical current and the bridge thickness are studied. It is found that the process did not affect the J_c of the film in the range of our experiment. The critical current of [our independently developed TlBaCaCuO polycrystalline-film] DC SQUID was optimized through this technique and quantum interference effect was observed at 77K.

Preparation of High-T_c Superconductors Using Polymer Metal Complex Precursor

40100066C Beijing DIWEN WULI XUEBAO
[CHINESE JOURNAL OF LOW TEMPERATURE
PHYSICS] in Chinese Vol 13 No 4, Jul 91 pp 276-280

[English abstract of article by Yang Peifang, Wu Chengpei, Gong Shangmin, and Ruan Yaozhong of the Department of Materials Science and Engineering, USTC, Hefei, Anhui, 230026; MS received 4 Oct 90]

[Text] High- T_c YBaCuO superconductors have been prepared from the low cross-linking polyacrylic acid metal complex precursors. It was found that the properties of these superconductors are almost the same as those prepared by the usual ceramic method, but the precursor method requires much shorter prefire time and lower sintering temperature for preparing of single-phase superconductors.

Superconductor Model Computer System Passes Appraisal

91P60211 Beijing ZHONGGUO KEXUE BAO
[CHINESE SCIENCE NEWS] in Chinese 4 Jun 91 p 1

[Article by Yang Yongtian [2799 3057 3944]: "Superconductor Model Computer System' Passes Appraisal"]

[Summary] Beijing—The "superconductor model computer system" successfully realized for the first time by

scientists and engineers from the CAS Institute of Electronics and CAS Institute of Chemistry will provide a useful tool in the investigation and development of high-temperature-superconductor (HTS) materials and in the study of superconductivity mechanisms. This project passed technical appraisal on 14 May.

In the opinion of the expert group led by HTS research specialist Gan Zizhao [3927 1311 6856], the new system integrates data on domestic superconductor materials with structural data, processes the information with technologies such as interactive graphics, and combines techniques from structural chemistry with computational chemistry theory. It is especially intended for study of superconducting material characteristic structures, atomic defects and dislocations, etc. The expert group has judged that this computer system matches the international state-of-the-art for such systems.

ISDN Theory/Methods/Technology Project Completed

91P60233 Xian XIAN JIAOTONG DAXUE XUEBAO
[JOURNAL OF XIAN JIAOTONG UNIVERSITY]
in Chinese Vol 25 No 3, Jun 91 p 14

[Unattributed article: "Research Project on Theory, Methods, Technology for Integrated Services Digital Networks"; cf. JPRS-CST-91-013, 20 Jun 91 p 5, JPRS-CST-91-015, 9 Jul 91 p 29, and JPRS-CST-91-017, 5 Aug 91 pp 19, 28-29]

[Summary] In January 1991, three subtopics (nos. 03, 04, and 06) of State Seventh 5-Year Plan key S&T project #75-69 (communications technology development) assigned by the Institute of Posts & Telecommunications Science to Xian Jiaotong University's (XJU) Computer Technology Laboratory and Artificial Intelligence/Robotics Institute passed technical appraisal. The experts at the appraisal unanimously agreed that this Integrated Services Digital Network (ISDN) technology development project has taken the leading place domestically and has reached the 1980's international level.

ISDN technology involves a set of specifications proposed in the 1980's by the Consultative Committee on International Telegraphy and Telephony (CCITT) to standardize the integration of various bearer services—such as public telephone transmission, data transmission and switching, FAXing, video communications, and broadband services (B-ISDN) such as digital color TV transmission and high-speed FAXing—into a single network. At a London conference held in January 1985, CCITT established a B-ISDN study group to formalize standards for broadband integrated networks that simultaneously support circuit-switched and packet-switched information transmitted over fiber-optic media at bit rates of 1.5-140 Mb/s [this is now standardized to 34-140 Mb/s].

The first subtopic, "A Study of B-ISDN Basic Theory & Techniques," is designed to elucidate basic theory and key technologies and to provide reference data (suggested technical parameters) for establishment of domestic B-ISDN standards. The experts appraised this part of the overall project as valuable not only to researchers but also to authorities charged with setting technical standards.

The second subtopic, development of a "packet switching module," is oriented toward CCITT's X.25 network protocol. Specifically, this subtopic covers development of a packet-switching interface module permitting simultaneous interconnection of multiple terminals with domestic public data networks.

The third subtopic, "A Study of Digital Processing Technology for Text, Graphics, & Speech," has resulted in the following three achievements:

(1) Proposal and realization of an improved adaptive coding technique for scenic images. The technique can

compress and restore any 512 x 512 x 8-bit B&W image; compression ratio is 1/20, and bit compression is less than 0.4 bit/pixel, with excellent definition and naturalness.

(2) Proposal of an improved residual-error normalization function technique for decision of clarity/distortion in fundamental-period sound. This technique can be used to synthesize speech at a rate of 2.4 bits/s [sic] with very good comprehensibility and naturalness.

(3) Development of a high-resolution image inputting system, including an independently developed 2048-line high-resolution image-pickup camera and image-acquisition card, as well as a text/graphics editing software package with an excellent man-machine interface. This system can process images input via FAX or image-pickup camera.

The technical experts noted that these achievements will provide a foundation for further domestic development of text/graphics/speech data processing technology in the Eighth 5-Year Plan, and that the project's speech and image compression/restoration techniques are the most advanced in the nation. Especially innovative are the interfaces and hardware systems and the text/graphics/image-oriented CCD [charge-coupled device] 2048-line-array high-resolution image-pickup camera.

These three subtopics were completed under the supervision of XJU Associate Professor Zhang Deyun [1728 1795 6663].

Reports on Fiber Optic Communications

Japanese Loan for Long-Distance Telephone Network in Northeast

91P60257A Beijing DIANXIN JISHU
[TELECOMMUNICATIONS TECHNOLOGY]
in Chinese No 6, Jun 91 p 48

[Untitled news brief by Li Jiaju [2621 1367 7467]]

[Text] A third Japanese-yen loan [to China] is about to be implemented. The total investment for the 42 projects covered in the loan comes to about 809.2 billion yen (about US\$6.22 billion), and all projects have been given out for public bidding. There are two telecommunications-related projects in the overall loan: one project, under a 10.1-billion-yen loan, is for telephone-network expansion projects in Tianjin, Shanghai, Guangdong, and six other provinces and municipalities; the other project, under a 6.5-billion-yen loan, is for a long-distance telephone network (construction of fiber-optic communications lines) in the Northeast.

Digital System, Drop-Insert Equipment Developed for Railroads

91P60257B Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 10 Jul 91 p 1

[Article by Li Shilong [2621 0013 7893]: "Digital Fiber-Optic System, Optoelectronic Drop-Insert Equipment Developed"]

[Summary] On 26 June, a digital fiber-optic system and optoelectronic drop-insert equipment passed the technical appraisal jointly sponsored by the Ministry of Railways (MOR) and MMEI. The experts unanimously agreed that this equipment is at the technical forefront domestically and that it will provide a major boost to the transformation of domestic railway telecommunications. This equipment was jointly researched and developed over a two-year period (from initial design to final production) by MOR's Second Survey and Design Institute and State-Run Plant 710. The optoelectronic drop-insert equipment employs time-slot interchanging and signaling interchanging technologies.

Domestically Developed 30dB-Gain EDFA Described

91P60257C Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 18 No 6, Jun 91 p 420

[Letter from Nie Chaojiang [5119 2600 3068], Li Ying [2621 5391], and Wu Fang [0702 5364] of Shanghai University of Science and Technology's Modern Communications Laboratory, and Chen Yingli [7115 5391 4409], Li Qu [2621 0507], and Hua Yimin [5478 0001 2404] of Shanghai Jiaotong University's Applied Physics Department; "30dB High-Gain Erbium-Doped Optical Fiber Amplifier"; MS received 18 Mar 91 (cf. previous reporting on EDFA development in JPRS-CST-90-024, 25 Sep 90 p 22)]

[Summary] The authors have developed a 1.536- μ m-wavelength high-gain (30 dB) low-noise erbium-doped optical fiber amplifier (EDFA) that is polarization-insensitive. This device will be a major tool in realizing long-range, high-bit-rate, high-capacity fiber-optic communications.

An internal-cavity-type 532 μ m [as published, should be 532 nm] frequency-doubling YAG laser was used as the pumping source; its acousto-optic Q-modulation frequency is 5-10 kHz, output steady-state power is over 35 mW, and Er-doped single-mode quartz fiber length is 25 m. Cutoff wavelength, numerical aperture, core diameter, and 1.536- μ m mode speckle diameter are 1.318 μ m, 0.192 μ m, 6.4 μ m, and 7.3 μ m, respectively. Erbium dopant concentration is about 40 ppm, and losses at 532 nm and 1.536 μ m are 4.9 dB and 5.2 dB, respectively. In our experiments, when the signal source was a 1.536- μ m-wavelength InGaAsP/InP laser diode (LD), the LD-into-fiber coupling efficiency was 32 percent; when the

signal source was the 532-nm-wavelength YAG laser, the laser-into-fiber coupling efficiency exceeded 80 percent.

When the input pumping light had a power of 20 mW, output gain measured 30 dB, corresponding to a gain/pumping power ratio of 1.23 dB/mW. The post-amplified saturated output power is 4.3 mW.

In the same system, we used an optical pulse signal with a prf of 1 GHz and a pulse width of 150 ps; at 1.536 μ m, we achieved a gain of over 20 dB.

Domestically Developed EDFA Passes Appraisal

91P60257D Beijing GUANGMING RIBAO in Chinese 10 Jul 91 p 1

[Article by Xie Jun [6200 6511]: "Major Advance Realized in Nation's Optical Fiber Amplifier Technology"]

[Summary] The erbium-doped optical fiber amplifier (EDFA) developed by scientists at Shanghai University of Science and Technology's Modern Communications Laboratory passed the appraisal sponsored by the Shanghai Municipal S&T Commission on 5 July. The experts at the appraisal considered this development a major breakthrough indicating that the nation's EDFA technology has reached the international state-of-the-art. Using domestically made materials and laser devices, these scientists achieved a maximum small-signal gain of 39 dB (an amplification factor of almost 10,000).

Domestically Developed DS5 Multiplexing Terminal Passes Appraisal

91P60257E Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 28, 17 Jul 91 p 5

[Article by Hua You [5478 1429]: "DS5 Fiber-Optic Communications Multiplexing Terminal Unveiled"]

[Text] The nation's first fiber-optic communications-line 565 Mb/s DS5 multiplexing terminal, developed by [MPT's] Wuhan Institute of Posts and Telecommunications Science, has passed the appraisal jointly sponsored by the State S&T Commission and MPT. This high-transmission-speed, high-capacity, low-error-rate, highly secure system has microcomputer monitoring, public-affairs on-line capability, data channels, interval communications capability, and other auxiliary communications channels. It can simultaneously provide 15,360 people with telephone service [i.e., 7680 duplex voice circuits] and is jam-resistant.

PCM DS3 BER Analyzer Developed

91P60257F Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 26 Jul 91 p 1

[Article by Du Guoxiao [2629 7559 1321]: "PCM DS3 Bit-Error-Rate Analyzer Developed"]

[Summary] A PCM [pulse code modulation] DS3 bit-error-rate (BER) analyzer was recently developed by State-Run Plant 863 as a key State Seventh Five-Year Plan project. This analyzer, used for PCM480 digital [microwave] and fiber-optic communications transmission systems, incorporates an 8031 monolithic microprocessor. The unit, which may be employed for a maximum continuous time stretch of 99 hours, meets mid-eighties international standards. It can replace imports, and is now being put into small-batch production at the plant; this product will be on the market sometime in the second half of this year.

Shanghai-Guangzhou, Shanghai-Nanjing Lines To Be Completed

91P60241A Beijing DIANXIN JISHU
[TELECOMMUNICATIONS TECHNOLOGY]
in Chinese No 7, Jul 91 p 47

[Untitled news brief by Huang Wenquan [7806 2429 6898]]

[Summary] MPT plans to complete cable laying on two State Eighth 5-Year Plan priority fiber-optic-cable projects—the 2500-km-long Shanghai-Hangzhou-Fuzhou-Guangzhou line and the 400-km-long Shanghai-Nanjing line—by winter of this year or spring of next year. Construction and management for these 2900-km-total southern coast projects is being handled by the Communications Construction Corporation (CCC). Supported by MPT and other organizations, CCC engineers recently visited various foreign companies—including Japan's Anritsu, Fujikura, and Sumitomo; the U.S.'s Hewlett-Packard and York; Sweden's Ericsson; and Germany's ANT—to conduct technical exchanges and for selection of fiber-optic cable instruments, and afterwards placed their orders for the foreign-made goods with the P&T Equipment Corporation.

Xuzhou-Huaiyin Line Under Construction

91P60241B Beijing DIANXIN JISHU
[TELECOMMUNICATIONS TECHNOLOGY]
in Chinese No 7, Jul 91 p 47

[Untitled news brief by Yu Dong [5038 0392]]

[Summary] Cable laying for the Xuzhou-Huaiyin County fiber-optic-cable trunkline funded by the Jiangsu Province P&T Office began in April 1991. This 219.7-km-long line runs from the Huaiyin Communications Tower through Siyang, Yanghe, Suqian, Suining, and Shuanggou, and terminates at the Xuzhou P&T Office's Telephone & Telegraph Building.

Broadband Integrated Services Microcomputer LAN Developed

91P60241C Beijing DIANXIN JISHU
[TELECOMMUNICATIONS TECHNOLOGY]
in Chinese No 7, Jul 91 p 47

[Untitled news brief by DIANXIN JISHU staff; cf. JPRS-CST-91-015, 9 Jul 91 p 29]

[Summary] A "fiber-optic broadband integrated services distributed microcomputer LAN" completed by Nanjing Institute of Posts & Telecommunications passed the recent appraisal organized in Nanjing by the Jiangsu Province S&T Commission. Based on a commercial microcomputer LAN supplemented by specially developed and expanded software and hardware, the new system can transmit over optical fiber several types of information, including color dynamic imagery. Targeted fields of application for this broadband integrated services LAN include industry, government office automation, production process control, imagery monitoring, and military command.

Two-Dimensional Adaptive Interpolation for Subsampled HDTV Signals

40100079A Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS]
in Chinese Vol 12 No 4, Jul 91 pp 8-12

[English abstract of article by Zhang Chuntian of Tianjin University; MS received 12 Feb 90, project supported by NSFC]

[Text] Subsampling/Interpolation is one of the important techniques in HDTV compression coding. In this paper, a new 2D adaptive interpolation algorithm for $\frac{1}{2}$ subsampled HDTV signals is proposed. The 2D interpolation value is represented by a weighted sum of 1D horizontal and vertical interpolation values. According to the local correlation of image, the weighting coefficients are modified pixel-by-pixel adaptively. The computer simulations show that the new adaptive interpolation algorithm has better performance in comparison with known interpolation algorithms. In consideration of simplicity of hardware implementation, only four pixels in the immediate neighbourhood of the interpolated pixels are used in the proposed interpolation scheme.

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Developments in Satellite Communications Reported

New Earth Station Completed in Tibet

91P60260a Shijiazhuang HEBEI RIBAO in Chinese
6 Jun 91 p 2

[Article by Qiu Sixue [6726 1835 1331]: "Shijiazhuang Institute 54 Completed Construction of Yang Hu Satellite Earth Station in Tibet"]

[Summary] Engineers from [MMEI's] Shijiazhuang Institute 54 completed construction of the Tibet Yang Hu [Lake Yang, 5017 3275] Satellite Earth Station in April this year. The institute had signed a contract in June of last year with Yang Hu Hydropower Station authorities for construction of this earth station, which will be used for long-range communications and weather reporting. Previously, PLA and Military Police maintenance workers at the hydropower station had encountered difficulties with conventional communications due to the high altitude and unusual atmospherics of the Yang Hu plateau.

6-Meter Automated Ground Station Given as Gift to Laos

91P60260b Beijing ZHONGGUO DIANZI BAO
[CHINA ELECTRONICS NEWS] in Chinese
21 Jun 91 p 1

[Article by Zhong Binguang [6988 2430 0342] and Liao Xuewen [1675 7185 2429]: "Satellite Ground Station Given as Gift by China to Laos Is Shipped"]

[Summary] On 6 June, two 10-ton trucks bearing a valuable gift presented by the Chinese government, as represented by Premier Li Peng, to Laos set off from

Hunan Province's Zhuzhou Radio Plant No 2 toward Guangzhou's Huangpu Harbor. The gift, a 6-meter automated satellite ground station, was arranged in August of last year, during and after Premier Li's visit to Laos. Li arranged the gift through China Broadcast Television's International Economic & Technological Cooperation Corp., which signed a contract with the Zhuzhou radio plant on 12 April this year.

Shijiazhuang-Tangshan DMW Project Passes Acceptance Check

91P60258 Beijing DIANXIN JISHU
[TELECOMMUNICATIONS TECHNOLOGY]
in Chinese No 6, Jun 91 p 48

[Text] Second-phase work on the Shijiazhuang-Tangshan 1920-circuit digital microwave (DMW) project passed the acceptance check conducted a few days ago by the Hebei Province P&T Administration Office. The completion of this new system, put into trial operation on 1 March, will relieve the overcrowded communications conditions in the central and northeast parts of the province. The Shijiazhuang-Tangshan DMW system uses DS4 [140 Mbit/s] technology, which provides high-quality long-distance circuits, clear voice quality, secure transmission, and good resistance to jamming.

Dutch-Funded Optical Fiber Plant Operational

40100071 Beijing BEIJING REVIEW in English
15-21 Jul 91 p 30

[Text] The Changfei Optical Fibre and Cable Co. Ltd., a Sino-Dutch joint venture, has recently gone into operation after three years of construction. It is the largest of its kind in China.

The new hi-tech venture was funded by the Wuhan Optical Communications Technology Co., the Wuhan Trust and Investment Co. and Philips Co. of the Netherlands. Total investment for the venture came to 72.5 million guilders plus 56 million yuan. Cooperation spans 20 years. Sixty percent of foreign capital was contributed by the Dutch government as loans, while the remainder was stock contributed equally by both sides.

By adopting Philips' world-leading PVCD technology, the optical cable manufacturing techniques of the Dutch Electronic Cable Co. and advanced management, the venture will produce 50,000 km of optical fibres and 4,500 km of cables a year. Annual output value will be around 150 million yuan.

Chinese experts said that the Changfei operations have brought China's reliance on import of optical fibre to an end. The plant will meet domestic demand and export 20 percent of its products.

Progress Claimed in Sichuan Cold Fusion Research

91FE0677C Beijing ZHONGGUO KEXUE BAO
[CHINESE SCIENCE NEWS] in Chinese
21 May 91 p 2

[Article by reporter Deng Xianchun [6772 6343 2504]: "Sichuan Cold Nuclear Fusion Institute Makes New Advances, Qian Xuesen [6929 1331 2773] Feels That Normal Temperature Nuclear Fusion Is Another 'Peculiar Function' That Goes Beyond Conventional Reason and Should Be Discussed from This Viewpoint"]

[Text] I learned from the "Sichuan Province Cold Nuclear Fusion Symposium" held on 4 May 91 that, working under extremely difficult conditions, nearly 100 men of insight at China's nuclear base area have been closely following international advances in cold fusion research and have achieved new progress in three major theoretical experimental studies on "overheating effects", "fusion products", and "theoretical models" and attained several valuable experimental results. After viewing research articles by Gou Qingquan [5384 3237 3123] and others in early 1991, Qian Xuesen responded: "I believe that quantum mechanics has now been placed into use from physics theory and become a new engineering technology. Moreover, from the perspective of high-temperature superconductivity, the brilliance is in its complexity. I believe that normal temperature nuclear fusion is a "peculiar function" that goes beyond conventional reason and should be discussed from this viewpoint."

China's famous physicist, Chengdu Science and Technology University professor Gou Qingquan, offered a new theoretical interpretation on room temperature nuclear fusion on 4 May 91. In April 1991, the magazine HUAXUE GONGCHENG [CHEMICAL ENGINEERING] reported on the interrelationship between overheating effects and the generation of helium-4 in cold fusion, which is that when overheating effects are apparent, helium-4 is also apparent. This confirms the interpretation of a theoretical model suggested by professor Gou Qingquan 2 years ago.

The High-Temperature High-Pressure and Atomic Molecular Science Institute at Chengdu Science and Technology University conducted experiments based on the theories of Gou Qingquan and detected exothermic reactions during 1990 and 1991. They also detected tritium products in heavy water at a content 50 percent greater than the background.

Institute 2 in the China Engineering Physics Academy used electrolysis to detect pulsed neutrons and also detected a tritium background and an inverse proportion between tritium and neutrons.

Southwest China Nuclear Physics Academy has detected obvious neutrons in a vacuum using a palladium electrode and charging with deuterium gas, confirming that after the deuterium gas enters the electrode, collisions of

deuterium atoms occur which cause a reaction to occur in the deuterium nuclei, and only then are neutrons released.

The Atomic Nuclei Science and Technology Institute at Sichuan University did experiments to suggest that methods should be found to measure the reaction cross-section of heavy hydrogen nuclei at extremely low energy levels to determine whether or not the phenomenon of a larger reaction cross-section is present.

All this research work shows from different perspectives that as soon as the deuterium enters the palladium or titanium crystal lattice, it makes it possible for deuterium-deuterium nuclei reactions to occur at normal temperatures. The deuterium-deuterium nuclei reactions in the crystal lattice are entirely different from high-temperature nuclear fusion reactions in a vacuum and are instead a reaction process in an open and complex system.

Over 40 experts at the symposium called for relevant departments of the state to give a high degree of attention to and make major efforts to support this research.

Synchronous Radiation Facility Update

91FE0677B Shanghai JIEFANG RIBAO in Chinese
28 May 91 p 3

[Article: "Major Progress at Synchronous Radiation Facility, Indicates China Has Attained Advanced World Levels in Technology Development in This Field"]

[Text] Gratifying news has come from China Science and Technology University: major advances have been made in debugging work at the State Electronic Synchronous Radiation Facility. At 0544 hours on the morning of 25 May 91, this facility's storage ring beam current intensity reached 211 mA at an energy level of 800 MeV.

This accomplishment not only achieved the state examination and acceptance index of 200 mA required by the Chinese Academy of Sciences, but also created another good accomplishment in low-energy injection storage ring beam current intensity accumulation for similar devices in the world. It indicates that China's special-purpose synchronous radiation device development technology has attained advanced world levels. After this project is examined and accepted by the state at the end of 1991, it will be opened to China and foreign countries. This is China's first special-purpose synchronous radiation experimental facility and it has a broad range of uses in physics, chemistry, medicine, materials science, surface science, measurement science, microscope technology, ultra-microfine processing, ultra-large scale integrated circuit photoetching, and other basic science and applied science and technology realms.

Sichuan University Makes Radioactive Isotope Cadmium-109

91FE0677A Beijing ZHONGGUO KEXUE BAO
[CHINESE SCIENCE NEWS] in Chinese
31 May 91 p 2

[Article by reporter Deng Xianchun [6772 6343 2504]:
"Sichuan University Makes Cadmium-109 Solution,
Low-Energy Photon Sources"]

[Text] The radioactive isotope cadmium-109 solution and cadmium-109 low-energy photon sources successfully developed by the Atomic Nuclei Science and Technology Institute at Sichuan University was confirmed by experts at an examination and acceptance meeting chaired by the China Nuclear Industry Corporation not long ago as filling in a blank space in China and attaining the levels of similar international products.

Cadmium-109 is a very important X-ray fluorescence excitation source and its greatest applications value at present is in the manufacture of cadmium-109 multi-purpose low-energy photon sources. It is capable of X-ray excitation in over 50 elements. When this source is matched with an X-ray fluorescence analyzer, it can be used for fast, sensitive, and reliable X-ray fluorescence analysis of the elements in alloys, minerals, and various materials. Using cadmium-109 as a radiation source for

oilfield production well loggers can achieve on-line measurement of oil well productivity and output. This source is now in wide use in foreign countries in the metallurgical, petroleum, geological, mining, biomedical, environmental, scientific research, and other realms. However, China relied entirely on imports for the cadmium-109 solution and cadmium-109 low-energy photon sources it required. This required the state to spend large amounts of foreign exchange and involved long delivery schedules. In some cases, the required product varieties could not be ordered, which seriously affected work. To break through this situation, the Atomic Nuclei Institute at Sichuan University, with assistance from the Nuclear Industry Corporation, began using its accelerator to develop cadmium-109 and cadmium-109 low-energy photon sources. After nearly 2 years of efforts, they developed high-purity no-carrier cadmium-109 solution and used cadmium-109 to develop three types of cadmium-109 low-energy photon sources. They achieved batch production of cadmium-109 radioactive nuclides in a Chinese-made cyclotron which had a product quality equal to that of imports.

Use of this source at Daqing oilfield and several plants and scientific research units confirmed that it could be used as a low-energy photon source and satisfy oilfield production well water content and density testing requirements and the requirements for use in X-fluorescence analyzers.

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